

THE SCIENTIFIC MONTHLY

EDITED BY J. MCKEEN CATTELL

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A Remarkable Textbook

Barber's First Course in General Science

By FREDERICK D. BARBER, Professor of Physics in the Illinois State Normal University, MERTON L. FULLER, Lecturer on Meteorology in the Bradley Polytechnic Institute, JOHN L. PRICER, Professor of Biology in the Illinois State Normal University, and HOWARD W. ADAMS, Professor of Chemistry in the same. vii+588 pp. of text. 12mo. \$1.25.

A recent notable endorsement of this book occurred in Minneapolis. A Committee on General Science, representing each High School in the city, was asked to outline a course in Science for first year High School. After making the outline they considered the textbook situation. In this regard, the Committee reports as follows:

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WALTER BARR, Keokuk, Iowa:—Today when I showed Barber's Science to the manager and department heads of the Mississippi River Power Co., including probably the best engineers of America possible to assemble accidentally as a group, the exclamation around the table was: "If we only could have had a book like this when we were in school." Something similar in my own mind caused me to determine to give the book to my own son altho he is in only the eighth grade.

G. M. WILSON, Iowa State College:—I have not been particularly favorable to the general science idea, but I am satisfied now that this was due to the kind of texts which came to my attention and the way it happened to be handled in places where I had knowledge of its teaching. I am satisfied that Professor Barber, in this volume, has the work started on the right idea. It is meant to be useful, practical material closely connected with explanation of every day affairs. It seems to me an unusual contribution along this line. It will mean, of course, that others will follow, and that we may hope to have general science work put on such a practical basis that it will win a permanent place in the schools.

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SEPTEMBER, 1917

THE WOODLOT: A PROBLEM FOR NEW ENGLAND FARMERS

By Professor JAMES W. TOUMEY

DIRECTOR OF THE YALE SCHOOL OF FORESTRY

HOW to get from the land more of the materials that feed, clothe and shelter mankind is becoming more and more essential with the passage of time. The better use of the land is a basic problem in New England at the present time. The right solution of this problem will maintain her population in the highest degree of comfort, help determine her future greatness and give her the power that makes for endurance. New England's prestige can not rest upon manufacture alone. It must be rooted in the economic development of the land. Germany's position in the industries, developed almost entirely during the past half century, rests upon a firm foundation in land usage. More so than most other nations she has learned how to attain the maximum yield of agricultural and forest products and at the same time she has experienced wonderful industrial development. New England in her fight for industrial development has neglected the foundation upon which it ought to rest. Her land, instead of becoming more productive as years slip by, has become less productive. The acreage used in agriculture is much less than formerly, and the yield per acre astonishingly low when compared with Europe. Her yield of forest products is less than formerly and the quality much lower, due to the practical extinction of virgin forests, the want of adequate protection and the lack of reproductive and intelligent management of the second growth.

The best use of the land requires an adequate conception of what crops, be they agricultural or forest, each particular site is best suited for. Every acre of land unsuited for agriculture that is settled upon and cleared is an economic waste. Every acre of land suitable for agriculture that is left in forest



A 40-45-YEAR-OLD STAND OF NATURALLY REGENERATED WHITE PINE, near Keene, N. H., 10 years after an improvement, thinning which gave a yield of approximately 5 cords per acre, worth \$5 per cord on the stump.

beyond the time when it can be profitably used for the production of farm crops is an economic waste. We who live in New England and are a part of the directing force in her development must clearly appreciate that the sixty-six and one half thousand square miles in the six New England states, all of which were covered with primeval forest at the time of the settlement of the country, consist of two more or less distinct classes of land, viz., agricultural land and absolute forest land. I mean by this that a certain part of the land, due to differences in climate and soil, is most useful and of the greatest economic value when developed for the permanent production of farm crops and another part, when developed for the permanent production of forest crops. Both of these classes of land ought to be developed in a manner progressively to increase the yield of the materials which feed, clothe and shelter mankind. More than 60 per cent. of the total area of New England is classed as forest and, in the opinion of many foresters, the climatic, topographic and soil conditions are such that at least 50 per cent. can be economically developed only when utilized for the production of timber. In other words, more than thirty thousand square miles of New England is absolute forest land—land upon which agriculture has no business, land that will wreck the fortunes of those who persist in utilizing it for purposes which the climatic and soil conditions make it wholly unfit.

How can these vast areas of absolute forest lands be wisely developed and, with the disappearance of the virgin forests, made to produce acceptable yields of second growth timber? Roughly speaking, they are either in large continuous areas in the non-agricultural regions, as in the White Mountains, or in more or less isolated fragments attached to farms in the agricultural regions. The former cover the large uplifts or northern regions of New England, and are largely confined to Maine, New Hampshire and Vermont. The latter are the New England woodlots, for the most part, on soils too poor or too rough for profitable agriculture. They are relatively abundant in Connecticut, Rhode Island and Massachusetts. How much of the absolute forest land in New England is in woodlots attached to farms we do not know. In Connecticut, Rhode Island and Massachusetts nearly all is in woodlots, in Maine a relatively small percentage. On a conservative basis the woodlots of New England include between 10 and 14 thousand square miles, owned in relatively small holdings. Woodlots, due to their comparatively small size, their separation from each other by tillable land, and the abundant, near-by population, should be easily protected from fire. Due to their nearness to market, the stumpage value of wood is usually high and the average quality of the forest soil is such that the yield should be large.

In recent years New England has made some progress in the



A 20-YEAR-OLD NATURAL STAND OF PURE WHITE PINE, near Keene, N. H., 10 years after freeing from overstanding hardwoods, chiefly birch.

organization of her large continuous areas of forest in non-agricultural regions, particularly for fire protection. She has done relatively little in woodlot forestry.

The farmers of New England should appreciate the basic fact that their farms include both agricultural land and absolute forest land. It is just as much the business of the state to encourage the best use of the absolute forest land as it is to do this for the agricultural land. Agricultural colleges, agri-



VIEW OF A 40-50-YEAR-OLD, UNTHINNED, PURE STAND OF WHITE PINE, near Keene, N. H., adjacent to an area recently clear cut, showing the refuse matter after the clear cutting with the larger limbs cut into cordwood.

cultural high schools, farmers' institutes, agricultural experiment stations and country agricultural agencies maintained and supported by the public are a good thing for better agriculture, but they will never serve their full purpose in New England until they help the farmers to a better understanding of the woodlot. The use of the land means the use of absolute forest land, as well as the use of agricultural land; the development of both must go along together.

Agriculture is as old as the race. The farmer knows from long experience that the productiveness of tillable land is measured by the intelligence and labor combined in working it. Nowhere does he expect the grains, fruits and vegetables as a free gift of nature. If we reap we must sow is universally accepted as the foundation of husbandry. Forestry is comparatively new. The farmer is just beginning to learn that the

productiveness of absolute forest land is also measured by the intelligence and labor combined in working it. He knows that the financial yield from 10 acres of tillable land may be as great as that from 100 acres of similar land under less intensive culture. He does not yet know that the financial yield from 10 acres of absolute forest land may be as great as that from 100 acres of the same quality of land less intensively managed. The financial yield per acre of both agricultural land and absolute forest land is chiefly a matter of the crop best suited to the site and of intelligent culture. If the farmer needs national and state aid in order to get the greatest use out of his agri-



THIRTY-YEAR-OLD WHITE PINE AT ENFIELD, CONN., regenerated by broadcast seeding on plowed land of first quality. After first thinning. Number of living trees per acre 767. Number of dead trees 1,004.

cultural land, how much more does he need such aid in order to get the greatest use out of his woodlot, which in New England is a very large part of almost every farm. The vast aggregate area of New England woodlots can not look to national, state, or community ownership or to public regulation for their improvement. Its possibility for future yield rests entirely with the individual private owner. The farmer does not appreciate the economic possibilities that lie dormant in his woodlot. Heretofore, in the utilization of the timber only the superior trees have been cut, the inferior species and those with crooked stems and other defects have been left. At intervals the wood-

lot has been reentered, the exploiters always taking the best trees and leaving the culls. Where wood for fuel could be removed at a profit, the stand usually was clear-cut. In many instances the young growth has been destroyed and only in recent years have serious attempts been made to protect it from fire. As a result there has been a tremendous change in the abundance and frequency of the various species. Thus white pine has practically disappeared from many woodlots where formerly it was abundant; while ash, black cherry, walnut, basswood, tulip, all important elements in the primeval forest, are rapidly disappearing, and gray birch, red cedar, sumac, and similar species of little economic value have vastly increased in both frequency and abundance.

Since the settlement of New England we have been trusting to chance to reproduce our woodlots after exploitation and fires. Acceptable forest stands, however, can seldom be attained by chance any more than an acceptable crop of wheat or an acceptable crop of corn. Forest crops must be intelligently arranged for and the necessary work performed. Although the intelligent farmer does not harvest his crop of wheat one year and expect a volunteer crop the next, it is altogether likely that he will harvest his woodlot and leave it to chance to reestablish a stand upon it. Practically no virgin timber remains in New England woodlots. They are nearly all second growth. Some have been cut over many times dur-



WHITE PINE PLANTATION, 26 years old, spaced 6 x 6 feet, after the first thinning.
Greenfield Hill, Conn.



WHITE PINE PLANTED UNDER HARDWOODS, near New Haven, Conn. Now in condition for the removal of the hardwoods.

ing the past two and a half centuries, others still retain worthless elements of the primeval stand. They are extremely variable in the character of the stand and in the density of stocking. In species, they vary from the highly valuable white pine to the almost worthless gray birch. The stands are for the most part irregular, open or fragmentary. They are producing but a small fraction of the usable materials that the land is capable of growing.

New Haven County, Connecticut, has, I believe, a fair average of the woodlots of New England. Their treatment has been on the whole no better or no worse than that accorded woodlots elsewhere. The productive power of the woodlots of this county under two and a half centuries of culling and clear-cutting without the intelligent arrangement for an acceptable second growth has been reduced to the point where the average annual cut from the 184,126 acres is but little more than one half a cord of mostly inferior wood per acre. Although close to an excellent market, the average annual financial yield is considerably less than \$1 per acre. Against this yield must be charged taxes, interest charges and the cost of protection. The present average income from the second-growth stands in New Haven county is so low that the farmer is losing money upon them. In other words, the average annual income derived from the 184,126 acres in New Haven county woodlots is

so low that it will not pay the carrying charges for interest on the market value of the land, the taxes and the cost of protection. In many instances, due to the poor quality of the soil and its deterioration through mismanagement, there is no useful growth whatever, the land is absolutely idle and the unfortunate owner must necessarily experience an annual loss.

What can the New England farmer do to remedy the present situation? What can he do to increase the quality and yield of products from his woodlot? It would be grossly misleading on my part were I unreservedly to advocate the removal of the present inferior stands and the establishment of artificial stands by planting more useful species. It would be wrong for me unreservedly to advocate the spending of \$10 or \$15 per acre in an effort to improve the present stands by eliminating undesirable growth through properly arranged thinnings and by seeding and planting the open spaces when the natural growth is too broken for a fully stocked stand. I mean by this that the New England farmer can rely upon no general statement as to what can be done, or what ought to be done in



A MIXED HARDWOOD STAND CUT CLEAR IN 1903-04. The photograph shows the operation of planting in the spring of 1904. Photographed in May. Maltby Lakes, near New Haven, Conn.



WHITE PINES, 60 TO 65 YEARS OLD.

order to improve his woodlot. Each woodlot is a problem in itself. What and how much the owner can profitably do, in order to attain an acceptable reproduction and take care of it afterward, depends upon a large number of variable factors. The New England farmer must be helped, must be guided in the development of the woodlot. In some localities, as in Keene, New Hampshire, the woodlot can very well become the most profitable part of the farm; liberal expenditures can be made in attaining regeneration, in protection and in thinnings, with the certainty of profitable results. The same expenditures made elsewhere, with different species under different soil conditions and with different markets, would as certainly be an economic failure. The farmers in New England must be shown where the woodlots are that will certainly pay if the necessary expenditures are made to grow the right species in fully stocked stands, properly protected and managed. They must be instructed in the most economical methods for attaining fully stocked stands of desired species. They must be protected against unreasonable tax laws and assisted in protecting their woodlots from fire, insects and fungi. Most of all, however, the farmer must be convinced that what he will get out of his woodlot in the future is measured by the intelligent labor that he uses in its regeneration at this time and in its future management. The New England state departments of forestry have a tremendously large task ahead of them. Their strength and power for usefulness are going to be determined very largely by how fully they are able to convince the farmers of the economic advantage of woodlot improvement wherever such is economically

possible, and how well they are able to lead them along the right course and keep them from economic mistakes. In this work they should join hands with the agriculturist and co-operate with the county agricultural agents. The woodlot owner must be reached on his own woodlot by some one who knows what the possibilities of the woodlot are.

Although at the present time, due to various adverse conditions, many farmers will find it to their economic disadvantage to place their woodlots under intensive management, others, due to the superior location of their woodlots and their suitability for particular species, will find it very profitable. What the farmer needs is more knowledge of forestry. He should know what he is warranted in undertaking with reasonable assurance of economic success.



WHITE PINES PLANTED ON AN EXHAUSTED FIELD.

Keene valley, in southern New Hampshire, is a broad, level stretch of light sandy soil, originally covered with a dense stand of white pine. It has been settled for more than 200 years, and the virgin forest has completely disappeared. The farmers of this valley have been for many years systematically improving the second-growth white pine in their woodlots. Many of these young, even-aged stands of white pine remind one of well-managed forests in Europe. Two years ago a farmer in this valley sold the stumpage on 22 acres of 60- to 65-year-old white pine for \$15,000, or at a price of nearly

\$700 per acre. The average value of 60- to 65-year-old mixed stands of hardwoods in the woodlots of New Haven county is approximately \$50 per acre. In 1871 a farmer near Keene planted a small, precipitous, exhausted field of less than three acres with white pine which was spaced 8 by 8 feet. The land was valued at \$10 per acre. Two years ago this stand of pine was sold for \$1,000. If this land had not been planted, in all probability its rough topography and sterile soil would have caused it to remain idle to the present day. A few days' work in the spring of 1871 has created present wealth to the extent of \$1,000. All over New England there are woodlots that have very large economic possibilities were they properly developed. It is the duty of the forestry profession, through state and other agencies, to force a renaissance in New England woodlots and lift them from their present deplorable, non-productive condition into a condition whereby they will yield in greater abundance and help to solve the problem of the best use of New England land.

THE INFLUENCE OF ARSENIC ON THE BACTERIAL ACTIVITIES OF A SOIL

By Dr. J. E. GREAVES

UTAH AGRICULTURAL EXPERIMENT STATION

SOILS are the earthy material in which plants have their anchorage, and from which they obtain their water and part of their food. They are in reality disintegrated rock, containing, intimately mixed throughout, varying quantities of decaying plant and animal residues. They are derived from the native rocks by a complex process known as weathering. This being the case, we should expect to find within the soil the same substances as were found within the rock from which that soil was formed. Some native rocks carry arsenic in varying quantities; hence, we should expect to find arsenic in some soils, and it has been found to occur to the extent of at least thirteen pounds per acre-foot of soil. It is quite possible if more virgin soils were analyzed arsenic would be found in many of them, and in some in quantities many times as great as here reported.

Furthermore, arsenic is continuously being added to many soils which probably were free from this poison at first. Smelter smoke often contains arsenic, and this finds its way from the air into the soil. Insecticides, such as lead arsenate, Paris green, and many others, are used on many plants and fruits to kill insects. Most of the arsenic of these compounds eventually finds its way into the soil. So we are not surprised to find Headden reporting that he had found in some Colorado soils as much as four hundred and fifty pounds per acre-foot of soil, while Grunner found arsenic to occur in some of the Russian soils to an extent many times this great. An extensive analysis of the sprayed orchard soils of western America showed arsenic to be present in all of those soils and varying from mere traces to five hundred pounds per acre. In some cases it occurred to a depth of three or four feet. But the most interesting fact was that in some of these soils there were even seventeen pounds per acre of water-soluble arsenic. It was not, however, always the case that the greatest quantity of water-soluble arsenic was found in those soils which contained the greatest total quantity of arsenic, for often soils were found which contained only a few pounds per acre-foot, and probably two thirds of it was in a

soluble form. So the conclusion has been reached that some virgin and many cultivated soils contain arsenic in large quantities, but the proportion in a soil is no index of the amount which is soluble in water. The latter is probably governed by many factors; *e. g.*, kind of soil, water-soluble salts in it, and form in which the arsenic was applied to the soil.

That the form in which the arsenic is applied governs largely its solubility is shown by an experiment in which one hundred grams of arsenic in the form of lead arsenate were applied to a soil, and to another portion of the same soil were added one hundred grams of arsenic in the form of Paris green. To still another soil was added enough arsenic in the form of zinc arsenite to make one hundred grams of arsenic. These were carefully mixed and allowed to stand for some time, after which an examination was made for soluble arsenic. The analysis revealed the fact that 14 per cent. of the lead arsenate was in the water-soluble form, 30 per cent. of the zinc arsenite was soluble, but over 80 per cent. of the Paris green was soluble.

Arsenic being in the soil, some soluble and some insoluble, it very naturally raises the question as to what effect it has upon the bacteria of the soil, for we know that any factor which influences these must indirectly influence the crop yield from that soil. This being the case, a number of experiments have been carried on to find out how this substance—arsenic—influences the bacterial activities of a soil, and it is the object of this article to examine a few of the facts revealed by this study.

One of the essential elements for crop production, and the one which is usually in the soil in the smallest quantities, is nitrogen. This, unless it be applied to the soil in the form of the costly fertilizer—sodium nitrate—must be prepared for the plant by bacteria. The farmer finds his crop is limited directly by the speed with which these classes of organisms prepare the food for his growing crop. If they are active, other things being favorable, he will get a good crop; but if they do not play their part, everything else being ideal, there is no crop.

Bacteriological examinations of cultivated soils have shown that usually those which are richest contain the greatest number of bacteria. The number in the soil is dependent upon the quantity and character of the food the bacteria find in the soil. If the soil is rich in plant residues, barnyard manure, and the like, many bacteria will be found there, pulling these substances to pieces, liberating gases and acids which act upon insoluble particles of the soil and render them soluble. One class of organisms changes the protein constituents of the soil into ammonia.

This type we speak of as the ammonifiers. One often detects their activity by the odor of ammonia coming from manure heaps. Now how is arsenic going to affect this normal bacterial process of the soil? The question was answered by adding varying quantities and different forms of arsenic to the soil and noting the results. The answer which came showed that the bacteria were not at first poisoned by the arsenic, but their speed of action was increased. The actual results showed that while the untreated soil produced in unit time one hundred parts of ammonia, soil to which sixty pounds of arsenic per acre was applied produced one hundred and three parts of ammonia in the same length of time. And it was not until 2,500 pounds per acre of arsenic was applied to the soil that the ammonia produced was reduced to one half that normally produced. The Paris green, on the other hand, retarded the action of this class of bacteria even in the lowest concentration added, and by the time 600 pounds per acre had been applied the ammonia produced in unit time had been dropped to one half normal. Thus, we find its poisonous action on bacteria is in a direct relationship to its solubility, and an extremely large quantity of lead arsenate would have to be applied to a soil before it would interfere with the ammonification going on in the soil. But we can not yet say that it is not injurious, for this is only one of the classes of bacteria which are working on the soil nitrogen. Most plants can not use nitrogen in the form of ammonia; it must be in the form of nitrates. This transformation is brought about by two distinct types of organisms. One of them feeds upon the ammonia produced and manufactures nitrous acid. Should the transformation close at this point and nitrous acid accumulate in the soil in large quantities, plants would not grow upon it, for this is a poison to plants. But in soils properly cared for only minute quantities of nitrous acid are found. As soon as it is formed another type of organism feeds upon it and manufactures for the growing plant nitric acid. This, when formed, reacts with other constituents of the soil, such as limestone, and it is ready to be taken up by the plant to manufacture nourishing food, beautiful flowers, or fragrant perfumes for the human family. How is arsenic going to act upon these groups of organisms? In order to find this out various quantities of the different kinds of arsenic were applied to the soil and a determination made of its nitrifying powers, with the result that the untreated soil was found to produce one hundred parts of nitrates in unit time, but the same soil to which had been added arsenic in the form of lead arsenate at the rate of 120 pounds

per acre produced 178 parts of nitrates. Or, in other words, in place of being injured by the arsenic, the bacteria were nearly twice as active in the presence of this quantity of arsenic as they were in its total absence, and it was not until over 700 pounds of arsenic, in the form of lead arsenate, per acre, had been applied to the soil that the bacterial activity fell back to one hundred. Even when arsenic in the form of lead arsenate was applied at the rate of 3,500 pounds per acre there was 68 per cent. as much ammonia produced as was produced in the untreated soil. The Paris green gave similar results. The untreated soil produced 100 per cent. of nitrates in given time, while similar soil to which arsenic, in the form of Paris green, was added produced, under the same condition, 129 per cent. of nitrates, but when higher concentrations of arsenic in the form of Paris green were added it became toxic, and eventually it stopped all bacterial activity; but the quantity added had to be very large, and it is not likely that sufficient would ever occur under agricultural practise.

So we find that arsenic is not injuring the ammonifying or nitrifying organisms of the soil, but how about the other beneficial bacteria of the soil? What effect has it upon them?

There are seventy-five million pounds of atmospheric nitrogen resting upon every acre of land. But none of the higher plants have the power of taking this directly out of the air. We have, however, certain bacteria which can live in connection with the legumes and assist them to take nitrogen from the air. Then we have another set of nitrogen-gathering organisms within the soil which can live free in the soil and gather nitrogen, and they may, under ideal conditions, gather appreciable quantities of nitrogen. It is quite possible that much of the benefit derived from the summer-fallowing of land is due to the growth of this class of organisms within the soil, storing up nitrogen for future generations of plants. For it has been found that they are more active and found in greater numbers in such a soil. All the work which the farmer puts upon the soil to render it more porous reacts beneficially upon this class of organism, for they not only require atmospheric nitrogen and oxygen, which are absolutely essential to their life activities but these must be obtained from within the soil, for the minute organisms can not live upon the surface of the soil; to them the direct rays of the sun mean death. How is arsenic going to influence this class of organisms which are so beneficial to the soil, but are so much more sensitive to adverse conditions than are the other classes of bacteria? Here we find that arsenic in

the form of lead arsenate, zinc arsenite, and arsenic trisulfide, stimulated this class of bacteria, and when arsenic in the form of lead arsenate was applied to the soil at the rate of 500 pounds per acre the nitrogen-fixing organism gathered twice as much nitrogen in unit time as it did in the absence of arsenic. But the Paris green is poisonous to this group of organisms when the minutest quantities are added to the soil, and this is most likely due to the copper and not to the arsenic found within the compound. Hence we find that arsenic stimulates all of the beneficial bacteria. But how does it act? Will it stimulate for a short time and then allow the organism to drop back to its original or a lower level as does alcohol or various stimulants when given to animals? Or will it act as does caffeine—continue to stimulate? From the results on men and horses we might expect the former, for we find that while it is claimed by the arsenic eaters of India and Hungary that the eating of arsenic increases their endurance, and there is considerable evidence to indicate this, it is only for the time being, and if the use be not continued the arsenic eater can not endure the same physical exertion as can others who are not addicted to the drug. Many European horse dealers place small quantities of arsenic in the daily corn given to the horse, as they find it improves the coat of the horse. But if a horse has been dosed for a long time on arsenic it seems necessary to continue the practise; otherwise, the animal rapidly loses his condition.

So we might expect it to be similar with the bacteria, and experiments have shown that, while during the first few weeks the bacterial activity of soils containing small quantities of arsenic is much greater than it is in a similar soil without arsenic, this activity continues to get less until at the end of several weeks it is no greater in soil containing arsenic than in soil containing none. But it is interesting to note that if proper conditions of aeration are maintained it never sinks to a level lower than in untreated soil.

Now why this stimulating influence of arsenic upon soil bacteria? A similar condition has been found to exist when soils are treated with carbon bisulphide, chloroform, or other disinfectants, or even heated, and many theories have been offered to account for it, but probably the most interesting is the idea held by Russel and Hutchinson, who claim that we have within the soil the microscopic plants, bacteria and also microscopic animals, protozoa, and that these minute animals are continually feeding upon the minute plants, with the result that the bacterial plants can not multiply as they could in the absence of these

protozoa. Now when a weak solution of an antiseptic is applied to the soil it kills many of the protozoa, and the bacteria, being no longer preyed upon by their natural foe, rapidly multiply, then as the antiseptic evaporates the few remaining protozoa start to multiply and soon are able to keep in check the bacterial flora of the soil. So we should find within the soil one species preying upon another, and possibly some terrific battles are waged by the microscopic forms of life within the soil, just as these are waged by the higher forms of life upon the earth's surface.

It is quite likely that this is one of the ways in which arsenic stimulates the bacterial activities of the soil. It acts more readily upon the protozoa than it does upon the bacteria, for it is found that soils heated just high enough to destroy the protozoa, but low enough to leave the bacteria unharmed, are only slightly stimulated by the arsenic. After the arsenic has been in the soil for some time it may become insoluble or some of it may be changed by moulds into a gas and pass into the air. Then the few protozoa which have not been destroyed by its presence rapidly multiply and soon hold in check the bacteria.

But this is not the only way in which arsenic acts, for some of the bacteria have become free from the soil and also free from all other plant and animal life, and it is found that these are stimulated so they bring about greater changes in the presence of arsenic than they do in its absence. This is due to the action of the arsenic upon these minute specks of living protoplasm, causing them to utilize their food more economically in the presence of arsenic than in its absence. And this we find is similar to the influence of the arsenic upon the cells within the horse.

Other experiments have demonstrated that the addition of arsenic to a soil causes the liberation of the insoluble plant foods of the soil, especially the phosphorus. So we find arsenic by various means stimulating all the bacterial activities of the soil, and these increased activities, as experiments have shown, are reflected in greater crops grown upon the soil. But this increased growth must be looked upon as due to a stimulant and not to the direct nutritive value of the substance added, and soils so treated would wear out more quickly and produce larger crops than would soils not so treated. But it is interesting and important to know that arsenic has to be applied to a soil in enormous quantities before it retards microscopic plant life, and most likely before it retards the growth of higher plants.

THE DEVELOPMENT OF PUBLIC OPINION IN RUSSIA DURING THE WAR¹

By ROBERT P. BLAKE

PETROGRAD

THE most marked feature in the development of public opinion in Russia since the beginning of the war is the appearance, after an initial period of accord with the government, of a steady and growing dissatisfaction with the ruling circles and their ways. This has culminated not in a revolutionary movement, as one might anticipate, but in an endeavor, by means of the mobilization of the physical and moral resources of the country, to carry the war through to a victorious conclusion.

The organization and unification of Russian society under the pressure exerted by the war has not been as immediate nor as complete as was the case with the other European countries. Towards bringing this about a number of factors have contributed. In the first place, the constitutional structure of the empire, being autocratic in its nature, is opposed, both in principle and in practise, to any movement which is based upon popular initiative. No society of any sort can be formed in Russia without preliminarily submitting its by-laws to the police authorities. Next, the profoundly individualistic nature and non-homogeneous character of Russian society itself has proved a great hindrance to united work. The weak spot has lain not in the work of individuals or of groups, but in the coordination of the work of these groups into a larger whole. It is just in this last point where the greatest progress has been made since the beginning of the war. It forms the latest important development in the social history of the empire. Lastly, but not least, nationalistic troubles have come to check the development of internal unity within the empire. The Jewish question has proved practically disruptive in this regard.

To understand properly the course of affairs in Russia during the war, it is essential to run back to a point some three or four months anterior to the commencement of hostilities, so as to gather up the threads of the later developments.

On the twelfth of February, 1914, Count V. K. Kokóvtsov

¹ Written in the Spring of 1916. We hope to publish an article tracing the later development in Russia, leading to the revolution.

resigned the post of prime minister, and was succeeded by I. L. Goremykin. The change of ministers gave the signal for the beginning of a vigorous reactionary policy on the part of the government, which found its expression in the following lines of action. In the first place, the administration consistently attempted to place a check upon the power of the Duma as a whole, and upon the rights of the members as individuals. Secondly, the press of the laboring party and the leaders of the trade-unions were made the object of a systematic and sharp persecution. Practically all the workmen's newspapers in Petersburg had been driven out of business before the war began by a system of fines, confiscations, and suits brought against the editors.

The conflict between the ministry and the Duma became very acute. Even such a conservative and nationalistic paper as the *Kievlyánin* (March 19, 1914) declared: "We are living upon a volcano." The social democrats and the laboring deputies tried to obstruct the discussion of the budget in the Duma (May 5, 1914), which led to their being excluded from the chamber for the remainder of that, and for the sessions immediately following. The general dissatisfaction thus aroused led to the rejection of the budget by a small majority (148-159; 143-147). This produced a profound impression throughout the country at large. The uneasy feelings thus induced were fostered and sustained by the fermentation which took place within the laboring classes. Strikes began in all the more important commercial centers in Russia. The exasperation of the workmen was envenomed by the merciless persecution which was carried on against their leaders and their press by the government.

Economic questions played a certain part in the outbreak of the strikes, but their political coloring is unmistakable. The leaders of the social democrats in St. Petersburg officially denied their connection with the disorders, and this is probably correct. The workmen themselves, however, admitted the political significance of their actions, and this is proven by the fact that the most serious disorders (St. Petersburg, May 23, 1914), when barricades were erected in the streets, were coincident with the visit of President Poincaré. In view of the later developments, the suspicion of German machinations was and is very widely spread in Russia, but there is no definite proof to settle the question.

In the meantime, however, black clouds had begun to loom on the European horizon. The bloody tragedy of Sarajevo was whole-heartedly condemned by all sections of Russian

society, but the natural sympathy of the country for the Serbians, combined with the evident intention of Austria to make a *casus belli* out of the affair, speedily caused the press and public opinion to swing around. The nationalistic sheets at once began a vigorous agitation in favor of the Serbs; the liberal papers were more reserved.

The Austrian ultimatum to Serbia brought the full seriousness of the situation home to every one, although personal observations firmly convinced me that the mass of the population even then did not believe that it would come to an open break. In official circles the impending danger was recognized upon the receipt of the news that Austria intended to hand in an ultimatum to Serbia. On that same day all furloughs were cancelled; officers were warned to be ready for active service. An official communiqué in the "Russian Invalid" gave notice that the government was most seriously concerned over the situation, while the tone of the nationalist press grew more and more warlike.

The excitement which prevailed in St. Petersburg from the twenty-ninth of July to the first of August, 1914, inclusive, passes all description. Every few moments a new extra appeared on the street; the newsboys were stormed by an excited crowd, and the sheets of paper, still damp from the press, melted like snow before the blast of a furnace. Rumors swept through the city like prairie-fires; nothing was too unlikely to find credence.

The handing in of the German ultimatum to Russia changed the internal situation in the Empire as if by the stroke of a magician's wand. The strikes among the working men ceased with Austria's declaration of war against Serbia, entirely apart from police measures. From the first of August onward all the cities of the Russian dominions were the seats of gigantic patriotic demonstrations: young and old, rich and poor, men, women and children united in expressing their loyalty by word and deed.

The best proof of the latter was afforded by the speed and smoothness with which the mobilization was carried out. In the "historic" session of the Duma (August 7, 1914) only the social democrats, true to their principles, came forward with a protest against the war. All the other groups made declarations testifying to their patriotic feelings.

The only discord in the universal concert, besides the *démarche* of the socialist party, was the somewhat dubious position which was assumed by the *Ryetch*, which is the semi-

official organ of the Cadets (C(onstitutional) D(emocrats)). This took the form of a—to say the least—cool attitude towards Serbia, and an exceedingly restrained—even disapproving—tone in commenting on the policy pursued by the government. This led to a furious polemic between the *Nóvoye Vrémia* and the *Ryetch*, and in the end to the closing of the *Ryetch* for some days. I have full reason to affirm that this was not the attitude of the remainder of the cadet press nor of the party in general, but arose primarily from the sympathy towards the Bulgarians which Milyukóv has always entertained. For this he was subsequently taken to task in his party's caucus, and he there admitted his error. The rooted distrust of the government and its ways which the progressives in general felt presumably played a part here as well.

The readers will easily comprehend the significance and the extent of the alteration in the political situation. This, of course, was not merely a product of the enthusiasm of the moment; other deep-lying causes were at work as well. In order to grasp this fully, we must bear in mind what the previous attitude of the Russian had been towards the German. It was profoundly different from the one which he adopted with regard to other foreigners. It is necessary to make a sharp distinction here between the upper and lower sections of the population. For the peasant the word *Nyémet*s (German) had for two centuries been synonymous with that of oppressor, either in the shape of a government official, or of a stern and unsympathetic factory superintendent; either as an overseer of a landlord's estate, or as a rich farmer, who kept himself strictly apart from the surrounding Russian villages, the population of which looked upon him with mingled envy and hatred. All his disgust and dislike the peasant sums up in the depreciative "*Nyemtchurá*." He terms all foreigners "*Nyémtsy*," as they are the specimens of the breed whom he sees most often.

With the educated classes the situation had shaped itself somewhat differently. In the forties, fifties and sixties of the last century, the tie between intellectual Russia and intellectual Germany was very close and firm. This stage of the development Turgéniev has immortalized in the figure of Bazárov in his "*Fathers and Sons*." After the foundation of the German Empire and the accompanying rise of militarism, we find a change in the order of things. While individuals continued to remain in close touch with Germany and with German thought, intellectual Russia as a whole ceased to feel a close sympathy with Germany. This trend was fostered by the attitude which

was taken by the Germans in the Baltic Provinces, whose inclinations have ever been exceedingly conservative and monarchistic. In the second place, the unmistakable connection between the reactionary movement under Alexander III. and influences proceeding from Berlin caused the sentiments of the intelligent class to cool still further.

Thus we can maintain without exaggeration that neither in intelligent circles nor in the body of the population was there ever the same sense of intimacy or the same fraternizing with the Germans which there has been, for example, with France since 1890. To what extent the government sympathized with Germanophile tendencies it is very difficult to say. A number of actions on the part of certain ministers—notably Maklakóv, the minister of the interior—can only be interpreted in this way. Such are, for example, the extraordinary lenience shown towards the richer German and Austrian subjects who remained in the two capitals, the delay and uncertainty attendant on their being sent off into the eastern governments, the slowness and the evident reluctance of the government to take steps to liquidate the affairs of the German colonists in the southwest provinces, and so on. It is a question here, however, whether it was a matter of personal belief, or whether the German party at the court was not behind it. The latter has been and is notoriously strong; the feeling of resentment both among the educated classes and among the mass of the population is correspondingly fierce and bitter.

Intimately connected with the above question are two others, which have vexed Russian politics unceasingly for the last generation, and which have by no means lost their acuteness at the present time. These are the Polish and the Jewish problems. A line or two about them will not be out of place here: we shall return to them again below.

The words of the Grand Duke's manifesto which promised a new era to the Poles were in general accepted with satisfaction by Russian society. The injustice, mismanagement and oppression on a petty and on a grand scale, which have marked the history of Russian government in Poland, were no secret, but the war seemed to give an opportunity to turn over a new leaf. Officialdom, however, and especially the minister of justice, Shcheglovítov, displayed an attitude toward the question which was more than cool.

The Jewish problem, that festering sore of Russian politics, did not fail to raise its hydra head. The subsidized press, in spite of the general demand from all quarters to cease quar-

relling and get together, continued its attacks and provocative articles against the Jews. Public opinion as yet had scarcely cooled down after the Biélis trial, and the course of events soon gave the anti-Semites new and promising material to exploit.

Such, in brief, is the outline of the situation as it was at the beginning of the war. The government had an unequalled opportunity to solidly unite with itself the overpowering mass of Russian society. Had it chosen to come half way and meet the demands of public opinion, it would easily have made its position impregnable. This, however, was not done. For this failure, in my estimation, two factors were primarily responsible. The first of these was the Russian bureaucrat's rooted fear and suspicion of aught that smacks of popular initiative. The second was the personal character of some of the ministers. I have in view here in particular the head of the cabinet, Goremykin, and to a lesser extent the ministers of the interior and of justice, Maklakóv and Shcheglovítov. People are not agreed in their ideas of the relative rôles which these men played. Public opinion in general is inclined to make Maklakóv the person to blame for the country's losing faith in the ministry. Progressive political circles, however, affirm that Goremykin really pulled the strings, Maklakóv being merely a tool in his hands. In my estimation, this view is nearer the truth. Goremykin, while not a man of real ability, was a clever politician, and got others to pull his chestnuts out of the fire for him. Maklakóv and Shcheglovítov were typical bureaucrats of the narrow type, who knew very well how to utilize the administrative machinery in order to put obstacles in the way of public opinion, but distinguished themselves in no other way.

The development of public opinion since that time has followed two lines. There has been a steady and progressive disappointment in the government and in its actions—not merely regarding the measures which it has undertaken, but likewise on account of those which it has not. The dissatisfaction evoked by this disappointment has found an expression not alone in polemical attacks, and (in some cases) violence on the part of the populace, but (what is more important) in a strong and growing movement towards the mobilization of the strength and resources of the country to aid in the prosecution of the war. This movement owes its origin to the activities of various national organizations. While its development has been under the eye of the government, and the circumstances of war time have compelled the latter to avail itself of the aid of popular initiative, the attitude maintained towards the associations by

the officials has been exceedingly cool. Not seldom have the national societies been forced to overcome the opposition, secret or open, of the ruling authorities.

In spite of the fact that all sections of the populations had solemnly declared that all internal conflicts should be dropped, the subsidized conservative press (*Zémshchina*, *Gólos Rúsi* and their ilk) continued its attacks upon the Jews. The cases of spying where the latter were concerned gave them only too good an opportunity to keep the popular mind irritated. The exceedingly reserved and suspicious attitude of the Jews in Galicia towards the Russian troops did not help matters. The anti-Jewish agitation at this juncture was in itself, perhaps, not such a serious matter, but the close connection between the Polish and Jewish questions gave thinking people cause for serious concern. The Russian press was deprived through the censorship of the possibility of discussing the question of Polish autonomy, while the doings of the local authorities contributed considerably towards dampening the enthusiasm among the Polish population. The manifesto of the Grand Duke gave promise of freedom to the oppressed peoples of Austria-Hungary, and this was formally confirmed by the Viceroy of Galicia, Count A. A. Bóbrinskiĭ. The facts, however, showed the matter up in a different light. The "dregs of Russian officialdom" were sent down to rule Galicia. The nationalist leaders, headed by the active, energetic, but tactless archbishop of Volhýnia, Evlógii, started an active persecution against the Unionist Church in Galicia, in spite of the direct instructions of the viceroy. The metropolitan of the Unionist Church, Count Szepticki and a number of Ruthenian nationalists were exiled to Eastern Russia.

Along with these nationalistic troubles, the discontent with the government's attitude and actions was given other material to feed itself upon. The governors systematically thwarted the attempts of the population to organize: the swift adjournment of the Duma made liberal circles uneasy. The original intention of the administration had been to prorogue the meeting of the legislative chambers until 1915, but the earnest representations of the deputies caused Goremyĭkin to reduce this period by half. The renewal of the session was fixed for November, 1914.

Russian society had been disturbed for some time by rumors of a memorandum to the government, in which a number of conservative leaders demanded a speedy conclusion of peace in view of the danger of a revolutionary outbreak. These reports induced the Moscow City Duma to dispatch a telegram to the

Emperor, requesting reassurance on this point. In response to this, a reassuring answer was received. In the meantime, however, the government issued a proclamation in which the blame for the above-mentioned stories was laid at the door of the social democrats. Shortly afterwards the news was published that the police had arrested eleven members of that party in a house upon the Výchborg Chaussée near Petrograd. Among them were five of the deputies of the Duma. The trial of the case came off February 23-26, 1915. Although it was proven in court that the members had not adopted the resolution which had been sent from abroad regarding the desirability of the defeat of the government, and had resolved to defer the beginning of any agitation until after the war, none the less all concerned, including the five deputies, were sent into exile. This decision, while properly grounded and motified from a legal point of view, deeply embittered many people. This feeling was intensified by the sentence which was passed upon the well-known emigrant, V. L. Búrtsev, at about the same time. The latter had returned to Russia to serve his country, and had been arrested at the frontier. He was brought to trial on the old political charges against him, and likewise exiled. Shortly afterwards the Russian Economic Society was closed. It is the oldest learned society in the country, with the exception of the Academy of Sciences, with a century and a half of honorable career behind it. Later on the minister of the interior, A. N. Chvostóv, admitted that the reason was that the Society "had become a center of public movement."

The facts mentioned above induced in the Duma at its reopening (January, 1915) a feeling radically different from that prevailing during the August session. In place of the enthusiasm which had then exalted the members, the deputies had now become intensely conscious of the real seriousness of the situation. The extreme difficulties with which the army was already contending in regard to ammunition supplies were beginning to become known. The members who had just returned from the front pictured the situation in the darkest colors, and showed how things really stood. General Suchomlínov affirmed that "everything was going all right," which declaration was later on branded as a "deception of the Imperial Duma" (Milyukóv's speech, August 1, 1915). At about the same time rumors of the shortage of ammunition began to circulate among the population.

A second matter which gave serious alarm to public opinion was the rapid rise in prices, which was particularly swift

during the months of November and December, 1914. The enormous extent of the Russian Empire, with its relatively scanty population, and weakly developed railroad system, makes it very difficult to meet and overcome by means of timely hauling any economic shortage. In addition to this, two of the main trunk lines which lead to Petrograd were almost wholly monopolized by the military authorities. The traffic organization of the Russian railroads had never been what it should be, and now, under the stress of war conditions, it became thoroughly disorganized.

A rise in prices on imported goods was of course inevitable, and was received more or less philosophically by the public at large. The steady rise in prices on food-products, however, touched each separate individual in the population in his most tender spot. This was the more acute in Petrograd, as the immediate territorial surroundings of the city are very poor in an agricultural way; meat and butter, for example, are brought almost exclusively from the Don Basin and from the Baltic provinces, respectively. The storekeepers naturally took advantage of the situation, and began to force up prices, while the approach of cold weather, combined with the scanty supply of wood on hand, caused all to view the coming winter with alarm.

After the January session of the Duma the public organizations began to bestir themselves in earnest, but it was the retreat of the Russian armies from Galicia and from Poland, beginning in the end of April, 1915, which gave a new and mighty impetus to this movement. Under pressure of misfortunes on the field of battle, the discovery of the Myasoyédov conspiracy, and the lack of ammunition, a state of mind fraught with grave consequences began to pervade the country. The government decided (rumor has it that General Yanushkiévitch, the former chief of staff, was the author of the measure), in view of the many instances of espionage which had been proved against the Jews, to expel the entire Jewish population from the territory immediately contiguous to the field of military activity. At the same time the "Black Band" papers continued and increased their *pogrom* agitation, scattering broadcast accusations of treachery against the whole race. Simultaneously with this a vigorous campaign was carried on against the Germans in the Baltic provinces, in which very questionable elements assumed the lead. The agitation had been begun by the *Nóvoye Vrémya* and some of the other papers. At first numbers of prominent men took part in the "society for the conflict with German oppression," but, in view of the dubious

character of the leading spirits in the enterprise, they speedily dropped out.

Overstrained nerves gave way in the outburst at Moscow (June 8-10, 1915). The true history of this affair has not yet been written, and perhaps never will be. Various versions are current as to the cause of it, but it is clear that no one factor is to blame for all the trouble. Many were evidently at work. What actually happened was the plundering and wrecking of six hundred and ninety-two business places and factories. One hundred and thirteen concerns belonging to German and Austrian subjects were destroyed, while five hundred and seventy-nine stores of Russian, English and French firms suffered. The police took no steps whatever to stop the plundering, but stood calmly by and watched. The mob turned its attention at first to those stores which belonged to subjects of the hostile powers, but later pillaged whatever came their way. On the third day the intervention of the troops put a stop to the affair.

The above-mentioned circumstances brought about a strong feeling of discontent with the government on the part of the population. What is more important, however, it likewise aroused a determination in the more vigorous circles of society to better the situation. The instruments which served for the furtherance of this project were those general national organizations which had existed previous to the war, such as the *zemstva* and the charitable, professional and learned societies, and more especially those new ones which had arisen during it. Of these the most important were the "General *Zemstvo* Alliance" and the "General Municipal Alliance."

The first of these societies was formed at the congress of delegates from the *zemstva* at Moscow, August 12, 1914. Prince G. E. L'vov, who had stood at the head of the *zemstvo* relief work during the Russian-Japanese war, and had then shown his talents as an organizer, was placed in charge. From the very first the alliance declared that the local peasant industry (weaving, shoemaking, etc.) should be organized and mobilized for the needs of the army, that the *zemstva* should take over and administer the requisitioning and preparation of food products and the like, and so forth. The ministry of the interior, however, put hindrances in the way of the development of the activity of the alliance, while the military authorities did not see fit to accept the offer. For this Russia later paid a shocking price in blood and money. The alliance was forced to confine itself to the organization of the care of the wounded, which the war department was not able to handle at all. At the end

of ten months (June 18, 1915), Prince L'vov was able to report that the alliance was maintaining (primarily on the basis of government subsidies) one hundred and seventy-five thousand cots for wounded soldiers, fifty-five special sanitary trains, and field organizations in all parts of the front.

Not long after the appearance of the *zemstvo* alliance came the formation of the municipal alliance. This was founded at the meeting of "town heads" (mayors) in Moscow, August 23, 1914. At this gathering it was pointed out that there was urgent need of intermunicipal action in order to regulate the distribution and transportation of food products. Here also the government put the same hindrances in the way of the extension of the field of the new organization's activities, and the municipal, like the *zemstvo*, was forced to turn its activities exclusively to the care of the wounded. Up to the end of the year 1915 it maintained seventy-six thousand cots and thirteen special trains in operation.

The difficulties which were met with in solving the problem of the large cities of the empire gave a new impulse to the activities of the two alliances. The minister of commerce and industry, Timashyóv, was dismissed (March 2, 1915), and his place was taken by Prince V. N. Shachovskói. The central provision committee, which was under the control of this ministry, was given special powers (April 14, 1915). Popular initiative, however, did not rest here. At the meeting of the Municipal Alliance in Moscow (April 19, 1915), the delegates appointed a commission to work out a plan to regulate the provision supply for the municipalities, while at the congress of the delegates of the produce exchanges and the agricultural unions, the ex-minister of commerce and industry Timiryázev and Prince Shachovskói laid strong emphasis upon the need of good relations between government and society so as to continue their coordinated work.

The continued misfortunes which overtook the Russian army in the field spurred the development of this movement. The deputies of the Duma began to insist that the legislative chambers be called together before the date mentioned in the ukaz announcing its adjournment (November 20, 1915). The congress of the representatives of commerce and industry passed resolutions (June 7, 1915) calling for the immediate mobilization of all the manufacturing resources of the country for the needs of the army. This impulse later developed into the gigantic industrial organization known as the "Industrial Committee for the Furnishing of Military Supplies for the

Army," through which are fulfilled all contracts made by the government in Russia. The effort of the government to put the affair on a primarily official basis was pronounced to be insufficient by public opinion; it was demanded that the *zemstvo* and the municipal alliances should also take part in the work. Lastly, they went on record that the Duma should be convoked without delay. At about the same time a number of different congresses were held, all of which insisted that the government must be responsible to the people.

The leaders of the different groups in the Duma met in the cabinet of the president of that body, and passed a resolution that the president, Rodzyánko, should see the premier about summoning the Duma as speedily as possible. Goremýkin agreed in principle, and, after a certain amount of delay, the ukaz summoning the legislative chambers was issued (July 22, 1915); the opening date of the session was fixed ten days later on.

In the meantime a very extensive reconstruction had taken place within the ranks of the ministry. The minister of public instruction, L. A. Káso, who had kept the Russian educational world in a state of continued irritation by a series of indirect and petty repressive measures, had died, and his place was taken by Count P. N. Ignátyev (January 9, 1915). The latter has so far made a very creditable record in his office. By the use of common-sense and good will he has succeeded in ameliorating the relations between the ministry and the schools to a notable degree. Immediately previous to the convocation of the Duma, the personnel of the ministerial bench underwent a serious alteration. June 18, 1915, the minister of the interior, Maklakóv, who had drawn more ill-will upon himself than any of his colleagues, was suddenly dismissed. Prince Shcherbátov was appointed as his successor. June 25 followed the resignation of General Suchomlínov, the minister of war, now under trial on the charge of high treason. His place was taken by the very able and popular General A. A. Polivánov. July 17 V. K. Sábler, the procurator of the Holy Synod, left his post, which was assumed by A. D. Samárin, the leader of the Moscow nobility. Lastly, July 31, the minister of justice, I. G. Shcheglovítov, was replaced by Senator A. A. Chvostóv.

In so far as these dismissals were the means of ejecting undesirable individuals, they unquestionably tended to satisfy public opinion, but as far as marking a change in the internal policy of the government, they had not the slightest significance. With the exception of General Polivánov, who, all agreed, was

the right man for the right place, the new men in the ministry were all from the conservative *zemstvo* circles. While themselves honest and upright, they did not possess the confidence of the country, because not men alone were needed, but the policies for which they stood.

Goremýkin, however, did not approve of the idea of a reformed ministry such as was proposed by the Duma. While granting that the government and the Duma must needs work together, he declared that only such bills should be brought before the legislative chambers as were directly concerned with the needs of the war. All measures which were aimed at "the bettering of the conditions of Russian life in times of peace" were to be shelved for the time being. One exception was made (belated at that!) for the question of Polish autonomy.

The deputies who succeeded the premier on the speaker's tribune of the Duma did not agree with this attitude, but pointed out that the government could only gain the full union and confidence of the people by satisfying some of the more pressing popular demands. A significant example of the state of mind within the Duma itself was afforded by the elections of new members to the committee on army and navy affairs. The old commission resigned, and in its place new elements came in from the left side of the chamber. The able and energetic constitutional democrat, A. I. Shingaryóv, was made its chairman. The attempt of the conservative elements to formulate a program based solely upon the conflict with German oppression and the rise in prices did not meet with the approval of the majority of the Duma.

In general there now began to appear strong symptoms of discontent with the results of the session of the Duma. As ever, Moscow proved the true barometer of Russian politics. A number of conferences (private in their character) preceded the meeting of the Moscow municipal Duma of August 27, 1915. Four resolutions were adopted on this occasion, of which the substance is as follows:

1. Moscow has full confidence in our valiant army and in the Grand Duke, and will uphold them and back them up to the last man.
2. The whole population must set themselves to work for the needs of the army.
3. A close and vital union between the government and the people is necessary. Moscow is certain that the Duma is able and willing to do its share in the matter.
4. A government is necessary which is strong through the

confidence of the people, and must be headed by a person whom the people can trust.

The majority of the members in the Duma were already approaching the positions which the Moscow resolutions had marked out. At the meeting of party leaders (August 19, 1915), a plan had been brought forward by the constitutional democrats of laying out a general scheme of intended legislation for the further work of the Duma. This project, in a somewhat altered form, forms the substance of the declaration of the progressive *bloc*. After a very heated discussion, it came out that the center and moderates of both wings were agreed to adopt some such plan. Neither the extreme radicals nor the extreme conservatives would give their approval to the project. In the course of a number of conferences the party leaders worked out the program of the progressive *bloc*. This was published September 6, 1915, in the Moscow; September 7 in the Petrograd papers. As this document marks a turning point in the evolution of the subject which we are treating, it is incumbent upon us to devote some attention to it.

In substance its demands are as follows:

A ministry should be formed which has the confidence of the country.

The policy of the government should be based upon and directed by its trust in the country. In particular, the administration should be conducted according to the laws of the country (and not according to ministerial circulars). The activities of the war department should be restricted to its own province. The personnel of the local administrative forces should be subjected to a thorough renovation.

In regard to certain points in the internal administration of the Empire, a tolerant, intelligent and consistent policy should be adopted by the government. All political and religious trials not directly connected with the war should be stopped. All exiles who have suffered as a result of such prosecutions should be allowed to return at once. All legal measures tending to restrain freedom of belief contrary to the ukaz of April 17, 1905, should be reversed.

Touching legislation on nationalistic and class questions, the press is to be restored. The Finns are to have mild treatment, and the staff of Russian administrative officials must be altered. The persecution of Finnish officials is to cease. The Little-Russians should have their press restored to them. The inhabitants of Galicia who are detained under arrest shall have their cases examined at once. The trade unions shall be allowed

to function once more. The persecution of the labor leaders and of their press shall be stopped.

In legislative matters there shall be complete agreement between the government and the Duma. All laws connected with the war are to be put through without delay. Certain other laws whose primary object is to further the organization of the country for victory should be worked out and put through the legislative chambers as soon as possible. Such are the income tax; a law concerning reforms in the structure of the *zémstva*, and the foundation of the same in the Caucasus and in Siberia; a revision of the law on cooperative societies; a regulation of the rest-hours for workmen; a raise in salary for the postal employees; absolute prohibition of vodka; a reform of certain points in judicial procedure.

This declaration was signed by the leaders of all Duma-groups from the nationalists to the constitutional democrats inclusive.

The appearance of the *bloc* on the scene created a sensation. The conservative press fulminated and raged: the extremists on the left cursed the moderate radicals and branded them as renegades for their alliance with the center, while much of the radical press criticized the program of the *bloc* from one point of view or other. In general, however, public opinion assumed an expectant attitude, and waited to see what might befall.

The cabinet hesitated for some time as to the position which it should assume. Goremýkin endeavored to get the conservative forces to form a *bloc* to support the government, but the leaders of the nationalists and the "octobrists" informed him that they were bound with the agreements which had previously been made. The leaders of the *bloc* had a conference with the comptroller of the Empire, P. A. Charitónov, a man universally respected for his ability and character. The latter laid the matter before the ministers. The opinions in the cabinet were divided. Most of the ministers spoke in favor of the *bloc*, but Goremýkin and the minority were against any concession.

The premier left for headquarters (September 10, 1915) to consult with the emperor, and returned two days later with the ukaz announcing the adjournment of the Duma on the sixteenth of September. Excitement ran tremendously high, but the Duma and the population preserved their sang-froid. The official and semi-official press endeavored to interpret this as a sign of the powerlessness of the *bloc*. The *Kolokól* (September 18, 1915) remarked: "The Duma has adjourned, but the popular sea is calm, and its waves as of old break indifferently on the shore."

Popular initiative now left the precincts of the legislative chambers and transferred its activities to the meetings of the *zemstvo* and municipal alliances in Moscow (September 20, 1915). On this occasion the policy of the government in dissolving the Duma was strongly condemned, and its lack of faith in the people was bitterly deplored. Both congresses chose a deputation to express their feelings in the matter to the Emperor.

The assumption of the chief command of the Russian armies by the Emperor (September 4, 1915) gave the signal for a reactionary movement. This found immediate expression in the reconstruction of the ministerial bench which followed. The procurator of the Holy Synod, A. D. Samárin, resigned his post (October 7, 1915). Simultaneously with him, Prince Shcherbátov, the minister of the interior, was dismissed. The latter's place was taken by the leader of the conservatives in the Duma, A. N. Chvostóv. The departure of the second minister was due, according to the *Nóvoye Vrémya*, "from reliable sources," to his disagreement with the premier on points of internal policy. In the last days of his holding office, he was forced to deny an audience to a deputation from the *zemstvo* and municipal alliances which desired to consult with him on questions which "lay outside his political competency." Chvostóv probably owed his nomination (very unexpected to everybody) to his speech in the Duma on German oppression (November 7, 1914). Lastly one of the more moderate members of the cabinet, Krivoshéin, the minister of agriculture, was dismissed, and his place was taken by A. N. Naúmov, a candidate from the most conservative circles of the nobility.

That the population was discontented with the turn affairs had taken was evidenced by the elections to the Imperial Council, where the representatives of the *bloc* gained twelve new members. Among them were such progressive leaders as Prince E. N. Trubetskói, P. P. Ryabushínskii, and A. I. Gutchkóv. The members appointed later were all strictly conservative.

To counteract this defeat, black band circles began a vigorous campaign against the progressive *bloc* under the leadership of the ex-minister of justice, Shcheglovítov. They declared that the members of the *bloc* were conspiring to overturn the government under the pretext of passing the most necessary legislative measures; likewise that they disregarded the words of the Emperor, "all for the war." Presumably in connection with this, the meetings of the municipal and *zemstvo* alliances, which were to have been called in Moscow in December, were

prohibited by the governor. The summons of the Duma was deferred by the ukaz of December 7, 1915, until the work of the budget commission should be completed.

The effect of the retreat of the Russian forces from Poland upon the public had been tremendous and shattering. The swift fall of the fortresses of Novo-Geórgievsk, Warsaw, Kóvno, Gródno, Brest-Litóvsk and Vılna, one after the other, had strained the nerves of the population to the highest point of tension. The inhabitants of Petrograd in particular disgraced themselves by a display of undue and exaggerated nervousness, but the same holds true to a certain extent of the rest of the country. The retreat was brought about solely by the shortage of ammunition, and stopped when the factories were in a position to supply the same. None the less, stories of treachery were flying about, and the words *pódkup* and *predátel'stvo* (bribery; treachery) were on every one's lips.

The halting of the German advance at the end of September, and the successful attack of the French and British on the German lines in Champagne calmed things somewhat, but in place of excitement and alarm came the inevitable reaction. A period of supineness set in. This feeling was strengthened by the reactionary policy which the government followed, by the economic difficulties in the way of obtaining food and fuel, and above all by the vast wave of refugees (*byézhentsy*), which flooded all the eastern governments. Four millions of unfortunates, in most cases wholly without personal effects, and practically destitute of means, were driven from their homes and forced to seek refuge in the more distant parts of the empire. The relatively speedy and successful distribution of this human avalanche was primarily due to the efficient work of the two alliances and of other private organizations.

The quartering of the refugees upon the villages caused a serious disturbance in the economic life of the country. Prices on food and lodging rose at once: the refugees themselves, being mostly women and children, and moreover receiving pecuniary support from the government, were by no means inclined towards field labor. The widespread dissatisfaction thus evoked among the peasantry forced the government to devote to it its most serious attention.

In the meantime the financial commission of the Duma had got the budget ready. The approach of the time for the convoking of the Duma was heralded by the resignation of Gore-mýkin. He was succeeded by B. V. Stürmer, a member of the Imperial Council, who had served as a governor in various parts

of the empire. He was noted as having been an enemy of the *zemstvo*, but, so far as any one could see, had exhibited no other capacities which could fit him for standing at the helm of the government at such a critical time. That he was a safe conservative goes without saying. A hint of his political alignment was given by the fact that he did not make a formal visit after his nomination to Count Ignatyev, the minister of public instruction, who was the one member of the cabinet who was on good terms with the progressive *bloc*. People were of course glad to get rid of Goremykin, but to get Stürmer in his place was, as one wag remarked, to get the king of clubs instead of the king of spades. Shortly afterwards A. N. Chvostov (the minister of the interior), who had started on his career with a great amount of talking to the newspapers, but had practically done nothing, was also dropped. Much more serious was the resignation of the minister of war, General Polivanov. Officially the matter was connected with disorders which occurred at the Putilov Iron Works, but there is no doubt that court intrigues played the largest part here. It was and is bitterly deplored by the country at large.

The Duma was at length summoned at the end of February, 1916. It was soon evident that the *bloc* was working well together. The attitude of the government and the *bloc* towards each other was one of armed neutrality, which was not specifically altered by the unexpected visit of the Emperor to the Duma. What the true significance of this very astonishing event was is impossible to say, and those who are best informed doubt if the Emperor was quite sure himself.

The *bloc* succeeded in getting the income tax law through the Duma and the Council; the cooperative bill passed the Duma before the Easter recess. The attacks on the *bloc* from the left and the right have not ceased, nor have they lost in vigor. The other general points for which the *bloc* is striving have not been attained, nor can they be, while a ministry of the present type is in power.

What, then, are our general conclusions to be with regard to the situation, past and present?

As regards the parliamentary side, we must note that for the first time in the short course of Russia's parliamentary history, a working coalition majority has been formed, which has proved its cohesiveness and ability under very adverse circumstances.

As regards national organizations, they have shown their vigor and capability in dealing with a series of very difficult

problems, in spite of an unsympathetic attitude—at times even direct hindrance—on the part of the government.

As regards the administration, the war has shown up its weakness and its disorganization, while more clearly than all else it has evinced its ability to adapt itself to new and unforeseen conditions.

As regards Russian society proper, and more particularly the thinking class, it has not, in my estimation, displayed itself in a very good light. While energy and enthusiasm have not been wanting, it has shown itself lacking in the persistency and will-power which carry a thing through to the bitter end. The want of intelligent general organization has made itself felt in every department of public activity. Unpreparedness played a large part, and government stupidity and obstruction have done their share, but Russian society must come in none the less for its share of the blame. On it alone must be placed the responsibility for the panic-stricken state which enveloped the Caucasus during the Turkish advance upon Sarakamýsh; which prevailed in Petrograd and Moscow during the German drive on Poland. This holds true more for the larger towns: the peasantry, especially of those districts which lie near the seat of military activities, have shown a much better and more determined spirit.

Thus the war has proved a great teacher. Along with the millions of lives which have been lost, and the tens of thousands of towns and cities burnt and destroyed, the people have been compelled to organize and to take command of the situation. After the war, without doubt, there will be great changes, whatever the outcome may be. For those true friends of Russia, who realize her faults, but love her for her good qualities, it is a source of consolation and encouragement to feel that the united forces of her people, brought to the light amid the thunder of the cannon and baptized in the tears of her suffering millions, have set firm foot on the road of progress, even though the goal be still distant. They alone, if it be possible for any one, shall bring it about that the developments after the war can expand along the lines of constitutional growth, and not take the form of a social deluge.

PATTERNS FOR PEACE OR WAR

By ELSIE CLEWS PARSONS

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I

AMONG the Zuñi of New Mexico certain rites for the dead are performed on a day the Indians call *ahoppa awan tewa*, "the dead their day." Bits of food are dropped in the fire by the women of the household and larger portions are taken by the men to a sacrosanct place on the river flowing into the lake under which, the Zuñi believe, live their dead. In the pueblos of a kindred tribe the food offerings are heaped at the foot of the cross in the center of the cemetery attached to the Catholic Church. A cross stands in the cemetery at Zuñi also, but at Zuñi the Catholic Church has been disestablished for almost a century—long enough for the Zuñi to believe that *ahoppa awan tewa* is utterly disconnected with Catholicism, that it is a ritual they have had, as they say, referring to their myth of subterranean origin, "since they came up."

Ahoppa awan tewa is, nevertheless, All Souls' Day and, whether the Zuñi took it over two or three centuries ago from their own Catholic priests or whether they copied it more recently from Mexican or from Mexicanized Indian acquaintances, it is a striking little illustration of acculturation, of that process of borrowing by one culture from another, which to the contemporaneous ethnologist is the most alluring and the most baffling of researches. Acculturation, the ethnologist will tell you, goes on whenever two different cultures are in contact, and he has an abundance of evidence, familiar and unfamiliar, to present to you. According to what rules acculturation goes on, however, why certain customs or beliefs or techniques are assimilated, and others ignored, why in assimilation there is now close imitation and now transformation, of the answers to these questions and to many others of a like kind the ethnologist is uncertain. As yet about the best he can do is to suggest—he would be sure to make the suggestion in the case of the Catholic rite at Zuñi—that borrowing is facilitated by a certain degree of preexistent resemblance; by the presence of cultural pegs, so to speak, on which the cultural novelty may be readily hung. At Zuñi, for example, centuries before the arrival in

1539 of Fray Marcos of Niza, the dead were prayed to and to them property was dispatched. To introduce a new occasion for prayer or gift was not difficult. The Cross itself, where in certain pueblos the gift was made, was a familiar symbol in ancient pueblo art. In other words, suggests the ethnologist, the success of a cultural innovation probably depends on the pre-existence of a cultural pattern, a pattern of belief or of practice, into which the alien belief or practice may be fitted.

This hypothesis in the theory of acculturation I would apply in brief to the contact between European culture and American culture since the great war and in particular to the contacts of their respective militarist and pacifist patterns.

Given the pacifist mood or character of the United States in the summer of 1914 and the present disposition of the country, it can hardly be questioned that of all the nations this nation has since the outbreak of the war covered the longest stretch of militarization. Its peace patterns have been very successfully invaded by militarist patterns. The theory of militarism that physical compulsion should be the preferred way out of social misunderstanding or incompatibility has been fairly well acculturated throughout the country. In a remarkably short period a system that would suppress by physical means or quasi physical means minority opinion at home and conflicting opinion abroad has been adopted. The plans for international arbitration that in very recent years had been to the fore were readily dropped, discredited outright or deferred until after the war, to be embodied in that love child of militarism and pacifism, namely the League to Enforce Peace. At home, principles of toleration for minorities, of freedom for conscience, of freedom of speech, of *lehrfreiheit*, of no discrimination against "race," principles which for a comparatively longer period had been under cultivation in the United States, these principles were also dropped, dropped with a facility amazing to many. In view of these facts, it is fair to say, I think, that European militarism, in so far as it is a theory of social adjustment, has been quite well established among us.

Why has this acculturation of militarist patterns been so facile, so unopposed? Is it because of preexistent resemblances, perhaps of patterns which lent themselves to militarism? Certain features of American life do give color to this theory. Negro disfranchisement, segregation and lynching suggest that racial discrimination is not altogether alien to American practice. A number of instances in the treatment accorded He-

brews might also be cited in this connection, as well as certain attitudes towards immigrants, particularly immigrants from southern or southeastern Europe. "Americanization," whether conscious or unconscious, is characterized not only by racial discrimination, it insists on homogeneity, and the homogeneity or like-mindedness it demands permits of so little variation that we are led to question whether respect or tolerance for minorities in general is a notable American trait. Those intellectual and moral timidities which are so notable, on the other hand, among Americans are not readily accounted for in the absence of intolerance of dissimilarity or dissent. As for freedom in teaching or discussing, would any radical who has had experience of editors, trustees or other agents or exponents of public opinion venture to say that American taboos were not peculiarly binding on speech or thought? What radical is not well aware that any charge of "atheism" or "free love" or "anarchism" or syndicalism, if taken seriously, will endanger his or her position or livelihood?

To be sure, the heterodox in religion, ethics, politics or economics are not always banned, for they are not always taken seriously. As long as they are accounted infertile or inconsequential they are tolerated. And as indifference to opinion, scepticism of opinion *qua* opinion, is a feature of American life, a large measure of tolerance appears to prevail. It is only when the practical man loses his contempt for the theorist that he becomes intolerant. But let the innovating theorist forget his place by any chance, the place where he is inconsequential, and he may count on quick suppression. For him the price of existence is remaining ornamental.

The ornamental radical is not only tolerated, he is even welcome, for he flatters the spirit of the practical man, giving him not only a sense of superiority in common sense, but a sense of tolerance. The practical American likes to think of himself as tolerant. The American, practical or theoretical, regales himself on catchwords and of all his catchwords "liberty" is one of the most precious. The American remains the child or rather the veteran of the eighteenth century and such eighteenth-century formulas as "liberty"—or "equality" or "fraternity"—he still refuses to examine. Indeed he even goes on applying them uncritically to fresh conditions—like the present war.

The present war, we hear, is being fought for liberty, for freedom from German rule, for the independence of small nations, to set the world free. The validity of these statements

I am not for the moment concerned with. I would merely indicate that war for human liberty is so familiar an American concept that any war, once it had taken on this aspect, would pass unquestioned. Once the European War was classified as a war for liberty with the war of American Independence or the Civil War, the European war was acculturated. None has understood this process better than the President. We are using the flag, he declares, as we have always used it, not for some new purpose but "for some old, familiar, heroic purpose for which it has seen men, its own men, die on every battlefield upon which Americans have borne arms since the Revolution."¹ Again, on June 5, at the annual reunion of the United Confederate Veterans, the President, after referring to ourselves as "an instrument in the hands of God to see that liberty is made secure for mankind," adds:

At the day of our greatest division there was one common passion among us, and that was the passion for human freedom. We did not know that God was working out in His own way the method by which we should best serve human freedom—by making this nation a great, indivisible, indestructible instrument in His hands, for the accomplishment of these great things.

From the point of view that the Revolutionary War was the beginning of a series of wars for freedom or that the Civil War was a divine preparation for the European War, the spirit of the European War is made thoroughly at home. As the Zuhni would say, "it has been with us ever since we came up."

II

Catchwords, in supplying a link between the old and the new or in making the new appear one with the old, seem to be a factor in acculturation. Catchwords may supply still other face-saving masks for conduct. I call to mind the not uncommon formulaic use of the term militarism. In the very moment of making vast appropriations for armament or for war, of declaring war or condemning discussion of peace, of voting conscription or establishing military drill in the schools, Americans would reiterate, "Never shall we become a militarist people." I confess to a feeling of impatience when first I heard this claim to what seemed like mystical immunity, and to making the obvious and futile retort, "But what are we now?" But before long I began to examine the claim or assertion, an assertion so plainly comforting to its makers that it compelled

¹ From a Flag Day speech reported in *The Times*, June 15, 1917.

examination. Was the assertion merely that of the infantile shirker saying, "This once, but never again; one lie will not make a liar, one misdeed will not affect the character?" Or was there, after all, some significant inarticulate self-realization under the childish expression? Is there, not certainty, but possibility that despite our efforts we shall fail of becoming a militarist people?

Are there, indeed, in this country any peace patterns that will prevail, at least in certain circumstances, against the militarist patterns—perhaps not in theory, but in practise? Militarist theory we have already adopted, but have we made up our mind to practise the theory at all costs?

Before trying to answer this question I would like to consider the one definite reason sometimes advanced for the belief that militarism can not prevail in the country. Militarism requires a caste system, it is argued, and caste does not develop in the United States. The argument appears to rest on another American catchword, or if you like, ideal, the ideal of equality. Not being an idealist, I can not help realizing the existence of the American caste system, and foremost in it the existence of the plutocratic caste. In plutocratic circles I see an element out of which a militarist caste might easily form. I refer to the rich by inheritance, the sons of the rich. Men of the second or third generation of wealth are peculiarly adrift in our society, having in it no particular place or power. Compare the sons with their self-made fathers and even with their mothers and sisters and wives. The fathers are not only rich, they are plutocratic. They get a sense of power from their wealth—power in finance, in business, or perhaps in naïvely and arbitrarily changing the face of nature. As for the women folk, they too, given the gynocratic conditions of American "society," they too enjoy power or the sense thereof. But for the husbands or sons of gynocrats or plutocrats there is little or no opportunity to count. Patrons of science or of the arts they may become, but then such patronage yields little social recognition in communities where science and art have of themselves small claim to distinction. Socially destitute and jobless, the sons of plutocrats and the husbands of "society queens," business men gone to seed, as Veblen has dubbed them, would seem² to be promising recruits for a militarist caste.

²In June I was present at the closing exercises of a certain well-known boys' "boarding school." On the platform sat a bishop and other clergy, a judge, and an historian. "You are here, boys, as in an officers' camp," were the words of one orator and the tenor of all. "You are to

Given eligible recruits, will the caste form? It is quite likely to form, I think. Recruited from the plutocracy, American army and navy officers will gain greatly in prestige, their social position, as we say, will be very much improved. Their distinctive points of view, their code and their etiquette will gain in definiteness and assurance. The profession will become even more exclusive than it is now, exclusive of persons who do not accept uncritically its boundaries and standards and outlook. In such exclusiveness and in such prestige we have the main characters of caste. But to what extent will such a militarist caste influence or control the community at large? On the answer depends the conclusion as to whether or not "we become a militarist people."

It is not possible, I think, to look far ahead in this matter. Militarism in school and more particularly in nursery may transform social values in a comparatively short period so that in time militarist standards may take the place at large of present-day plutocratic standards. Until that substitution takes place, however, our military, reconstructed and reinvigorated though it be, will be kept under by the very class to whom it owes its renaissance, by finance and business.

Not that the American plutocracy will refrain from developing its own militarist polity. But it will be merely a polity to its own advantage, and the military will be merely its tool. No doubt recent history will be repeated. It was the plutocracy supported by the military as well as by satellites in the other professions who "willed participation" in the European war. The plutocracy had profited greatly from the European war. As long as this profit was uninterrupted, American business as a whole looked to the administration to keep the country out of war. But when war profits were threatened by submarine attacks and still more importantly by the psychological effects of these attacks, when railroads and docks were congested and commerce seriously threatened, war was demanded. The declaration of war against Germany was essentially a declaration that American business would be protected.

American business prospered upon war in Europe. Rather than submit to the checks upon this prosperity imposed by the submarine, American business preferred declaring war. But be the captains of your country." . . . "Study history," said the historian, "the value of the study has just been proved. It is thanks to us with our knowledge of history that the masses in this country are now at war."

Military drill has been introduced into this school, let me add in the words of its rector, to develop "patriots who are preparing themselves against war."

with the country actually at war, burdened with war, will American business continue to prosper? That is the real issue for war or peace current in this country to-day. It is a question of economics. Upon whom will the economic burden of this war fall? If the war tax system paralyze business, as we say,³ instead of stimulating it or diverting it into new channels, business will turn against war. Under a heavy excess-profits tax business men would become pacifists. Under a confiscatory surplus income tax the plutocracy as a whole would turn pacifist. But if taxation merely divert business, if it merely suggest new ways of expending income; if taxation fall upon the little man, upon the subject economic classes, then the ruling economic class will hold out for war. War will continue to mean profit, economic or "social," an asset for income or for prestige, an occasion for "fairs," benefits, and committee organization, an opportunity for persons anxious to give proof of their social worth.

The effect of war upon business is the touchstone in this country for the desirability of war. Activities other than business, less valued activities or interests, war may injure without serious consequences to a militarist polity. Science, the arts, experimental education, experimental government, may be damaged with impunity, their hold or appeal is so slight. As for the other activities or interests of life, many of them, like philanthropy, for example, will be merely diverted by war, many of them will be even stimulated, for example, parental and kinship interests, sociability at large. Gregarious satisfactions war enhances, for other satisfactions war creates substitutes, it is only the economic satisfactions which are positively curtailed by war. In this war, upon what class in America is the curtailment to press? Who will pay the bill of the war, not the bill in terms of life or spiritual suffering, but the bill in economic terms, in terms of labor or property?

If, paradox though it seem, the ruling class is unable to make the subject classes pay, the ruling class will suffer a change of heart towards the war. And there is a chance that the plutocracy may fail, fail either through bond issue or taxation, to make outsiders pay. The failure, should it occur, would be due to the absence of the stock war patterns of fear or of its offspring hate. Fear of invasion is not really felt through-

³ Thereby, of course, becoming economically an inefficient system. I would not dispute the fact that war taxes which are oppressive of business are from the point of view of war revenue undesirable.

out the country,⁴ nor is desire for reprisal as yet telling. Plutocratic representatives have been well aware that in this sense America is not awake, and they have been at some pains to stimulate the stirring emotions. "I feel that people are not altogether awake to the seriousness of this war," declares the president of a great bank, adding:

We are in a very serious war, war that might even come to our own shores.⁵

Another banker says:

I pray that whatever may be needed to arouse us . . . will come to us, so that we may realize that we are to-day not only fighting for the principles upon which our Republic was founded but for our very existence.⁶

Under the caption of "A Call for Righteous Hatred to Aid our Awakening" a trustee of the American Defense Society, a well-known New York lawyer, writes:

Let us summon to our aid [in understanding the pan-German plot] two motive powers which have not yet been enlisted—fear and hatred. . . . Every justifiable basis of both fear and hatred exists to rouse America to the implacable determination that at the cost of her last man and her last dollar Germany must be destroyed. . . . We also must slay or be slain.⁷

During the fantastic sale of the government's first war bond issue government aviators dropped circulars pleading for the purchase of war bonds which read:

It might have been a German bomb. To avoid Bombs, buy Bonds.

To further promote the sale of the bonds the Secretary of the

⁴ Given the huge numbers of Germans among us and our preference for German immigrants, it is somewhat difficult to arouse panic over further invasion, even on the premise that such invasion would be by the German government, not by the German people. Europeans critical of the distinction so greatly popularized in this country between the German government and the German people overlook the necessity of the distinction. Germans viewed as "people" are too familiar and too well liked to fear, it is only Germans viewed impersonally and mystically as "government" that can inspire the indispensable terror.

⁵ From a Liberty Loan speech by Frank A. Vanderlip, *New York Tribune*, May 22, 1917.

⁶ From a Red Cross speech by H. P. Davison, *New York Times*, June 16, 1917.

⁷ Letter to the *New York Tribune*, June 5, 1917.

Treasury suggested that the German invasion would mean retreat into the interior and payment of half the wealth of the country as an indemnity.

The secretary, the lawyer and the bankers appreciate that to make war without the aid of unimpaired war psychology is a difficult if not an impossible task. In any country of modern culture but the United States it would indeed be impossible. Here where the hold of "ideals" is so strong, where between ideals and reality no connection is sought, war ideals may substitute for war emotions. To make the world safe for democracy, to fight for civilization or humanity, or, gem of idealist abstraction, to fight for the brotherhood of mankind, are ideals that may succeed as stimulants to war—at least for a time.

In a war run on ideals, however, there is peculiar danger of defection. Given a sharp enough experience of hardship or privation, mysticism may give way to a sense of reality. In this case American shrewdness may get the better of American ideals, or, rather, "common sense" may conclude that idealism, no longer its servant, must be repudiated. The slogan, "A rich man's war" is ready made. Then, unless war patterns other than the pattern of idealism have been established, a struggle may ensue to put the burden of the war on the class who willed the war. The war spirit of reprisal, if not turned upon the alien, may turn upon those at home deemed responsible for high prices and heavy taxes.^a

Were large groups, labor or small-business groups, to seek in consequence to escape from under the war burden, perhaps to effect a radically different distribution of wealth, the plutocracy would be alarmed. Indeed it might be alarmed enough to look instinctively for new ideals for peace. It might declare that war against "socialism" was a holier war than war against Germany, that the autocracy of socialism was more dangerous to civilization than the autocracy of any one government.

Hitherto anti-war individuals or groups have been accounted pro-German, hence negligible. Were anti-militarists to turn their attention away from peace terms to changing the distribution of the war burden at home their efforts could no longer be discounted as pro-German. Their efforts would be taken seriously. Their efforts would be generally described in

^a Already a note of warning has been heard. "The pacifists have singled out the rich as mainly responsible for the war," writes a New York banker. "It may be due, consciously or unconsciously, to a resulting feeling of resentment that the proposal to confiscate during the war all incomes beyond a certain figure is actively promoted by leading pacifists." ("Some Comments on War Taxation," by Otto H. Kahn.)

Mr. Kahn's terms as "practical socialism under the guise of war finance." Then in self-defense the plutocracy might come to desire peace. Preserving the social order would seem more important than a war to end war. To make the country safe for plutocracy would become more urgent than to make the world safe for democracy. The slogan, Peace for Democracy would disposses the slogan, War for Democracy. At any rate democracy, that democracy which is the opposite of socialism, begins, we should hear, at home.

Dread of socialism or of currents setting strongly towards socialism may end the present war for the United States⁹—but what of future wars? Will the plutocracy have learned its lesson for peace if it has to pay the bill? Will militarism be discredited in its eyes? No indeed—social lessons are not thus learned, learned for good, either by classes or by nations. The only effect upon the penalized plutocracy would be to inspire it to preparedness, to preparedness against having to pay the bill for the next great war it might desire. An important part of that preparedness will be developing a nationalistic spirit. In this the reconstructed military will be of service. A series of "little wars" will also be of service. They will be wars to keep patriotism vigorous and distracted from anti-plutocratic home enterprises, wars to give an army and navy based on universal service something to do, and wars to benefit commerce and finance. In other words, they will be wars for the good of "backward" peoples. Thus for the good of others we may become a militarist people without knowing it until some day, perhaps in a century or so, the then League to Enforce Peace, shall we say, or internationalized Europe turn against us and, like Germany of the twentieth century, we find ourselves with a fight against the rest of the world on our hands.

⁹ Although not necessarily for European nations. To the ruling classes in Europe socialism is more familiar and less abhorrent than to the ruling classes in the United States, much less of a bugaboo. And then the ruling classes of Europe have been impressed together with the subject classes with the patterns of fear and hate, so that they are willing to make class sacrifices. That these class sacrifices are only temporary they may also believe.

IMPORTANT FACTORS IN THE QUESTION OF RESPONSIBLE BEHAVIOR

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IT can not be emphasized too strongly at the outset that the question of responsibility is fundamentally a question of native endowment given emphasis and direction through the quickening influences of an ever-impinging environment.

That the emphasis as here suggested is by no means generally palatable is abundantly attested by the prevailing practices in organized educational agencies for the development of normal human beings and in the specially organized corrective agencies having to do with wayward youth, still plastic; and having to do with hardened adults whose character and habits have set like the plaster on our walls. Nor will such emphasis become universally tasty until subjective standards, points of view, are effectively displaced by the non-personal, the rigidly objective. Among other things such a reversal in standpoint involves complete abandonment of all forms of anthropomorphisms and the frank acceptance of physical and perhaps mental continuity. The children of man in such a view are regarded as the offspring of parents representing the culmination of the organic series of creation and are endowed with characters the ancestry of which, in the final analysis, reaches the plummet of evolutionary history. Such a view makes man and his children integrally related with the world—establishes kinship in open acknowledgment. Moreover, it involves the abandonment of an aprioristic transcendental moving principle which comes from nowhere, but is somewhere located in the human body. Obviously, educational leadership in so far as it operates under such a principle and from an anthropomorphic standpoint is false as measured by modern empiricism and by the test of conceivability as science knows the test.

McDougal¹ in commenting on such a materialistic view of behavior observes:

Under these conditions, the working hypotheses of the natural sciences become confidently held doctrines from which we feel ourselves able

¹ McDougal, "Mind and Body," p. 144. The writer does not wish to convey the misleading inference that this quotation represents McDougal as holding a materialistic position; in its original setting the complete paragraph fits McDougal's animistic beliefs.

to deduce the limits of the possible; and we seem able to rule out from our scheme of the universe all that confused crowd of obscure ideas which, under the names of magic, occultism, and mysticism, have been at war with science ever since it began to take shape as a system of verifiable ideas inductively established on an empirical basis. Once admit, on the other hand, that psychical influences may interfere with the course of physical nature "you don't know where you are," you can no longer serenely affirm that "miracles" do not happen; they may happen at any moment and may falsify the most confident predictions of physical science. Thus the gates are opened to all the floods of spiritualism and superstition of every kind which . . . seem to threaten to light up once more the fires of persecution and to drag down our civilization from its hardly-won footing upon the steep path of progress.

A frank adoption of the objective standard to which I have referred requires a knowledge of the architecture, function and endowment of the human organism. No teacher should practise the art and certainly not the science of education, no social reformer should attempt reformation, who does not possess some information regarding the psychophysical nature of the creature to be taught or reformed. To know the structure, function and general endowment of the human organism; to appreciate its physical relationship to the world in which it lives and to believe that the springs of action and behavior are essentially internal; these constitute the irreducible prerequisite to an intelligent understanding of responsible behavior. Not until then will the army of educators, penologists, criminologists, philanthropists link the question of responsibility and the function of punishment with an *a posteriori* view of the educative process. Least excusable is the absence of such orientation in higher education, for it is here that prospective teachers and social workers should acquire a viewpoint which is consonant with modern science.

It should also be emphasized that the human organism, in common with all living organisms, is immersed, as it were, in a sea of environmental stimuli which unlock the human organism's inherited forces which form its dynamic energy. The question of the relation of environmental stimuli and innate energy and the rôle of each in the development of the final adult behavior lies near at hand.

The current and historical views regarding the efficiency of each or both of these factors in human development may be sufficiently classified into three groups: (1) The absolute efficacy of hereditary characteristics, (2) the absolute efficacy of the environment, and (3) the joint product of native endowment and environmental stimuli.

The first view involves the belief in a rigid physiological

teleology in which the end, *i. e.*, adult character, lies embedded in the matrix of inheritance. In this matrix is found the *termini a quo* and *ad quem* of behavior. From this point of view the adult character, as the culmination of its resident end, potentially exists in embryonic life and each stage in its development may be regarded as a fatalistic realization of this character. The budding, developing child grows unerringly according to inherited mandates lodged in its constitution; this growth takes place without let or hindrance which may be devised by organized social agencies. In such a view the pre-organized adult elements of behavior constitute active forces seeking out from among the environmental sea of nature's stimuli those destined, by the scheme of things, to actualize these elements. A fitting dictum for such a position is: "A silk purse may not be made out of a sow's ear." "Hewers of wood and drawers of water" are with us, always have been, always will be and this because of unequal endowment, certainly not by reason of the absence of social and educational opportunities.

Logical consistency would seem to require that the exponents of this view push the intrinsic character backward beyond the given infant to the entire strain which constitutes its long lineal descent. Variety of character, it would seem, is bounded by the varying degrees of dominance of the elemental characters comprising the strain. Each fertilized egg of such a strain may represent a unique combination of self-sufficient forces which spin themselves to adult realization according to intrinsic laws. But the designation of such forces as 'self-sufficient' or 'self-determined' are as empirically barren as an entelechy or any of the tribe of animistic principles. Empirical demands are perhaps more completely satisfied when the forces are regarded as chemical correlates or perhaps better as dynamic relations in which the integrative factor is some dominant metabolic wave or gradient of activity.²

There is much in the world which lends color to such a view. In the biological field consider certain of the modern conceptions, such as the congenital tendencies to criminality or the tendency of supernormal persons to insanity. Move a little higher up (or a little lower down, depending on your point of view) on the social ladder and consider the millions of social derelicts who are unable to carry their own load in the world, millions more who are scarcely able to cling to the

²E. M. Child, "The Basis of Physiological Individuality in Organisms," *Science*, N. S., Vol. XLIII., pp. 1-12.

sod of bare subsistence. These cases typify the dictum that "some mortals are not so much born into the world as damned into it" and lend color to the belief that man is *in toto* a product of the virile determinants lodged in his constitution. The inevitable consequence is clear—constitutional limitations whether of the over- or under-emphasis variety with certain surety consign such mortals to the lowest rung of the ladder of responsibility, and this constitution is the terminus which can not be transcended by pedagogical devices, however adept the pedagogue or refined his tools. Here dispositional tendencies appear as protruding energies *seeking out* mechanically or animistically, as you will, that environment which is appropriate for their realization. That environment which is relatively or wholly disregarded is viewed as non-contributory to the actualization of innate tendencies. From this point of view, education is not so much a 'drawing-out process' by organized or unorganized educational agencies as it is a 'drawing-in process,' in which the environment plays a passive rôle. What we find here is an operation strictly internal.

Frankly, this view makes an end of individual responsibility and prohibits punishment. In so far as the question can become a question at all it must rest with the immediate or remote progenitors of the individual. What we actually find here is an infinite regress in which each member of a pair of progenitors points to his father and mother as responsible for the character he possesses. We find in this view a fatalism so rigid as to make utterly futile the efforts of organized and unorganized educational agencies for the betterment of mankind.

That our theologians have overlooked this modern form of biological predestinarianism does not argue favorably for their argumentative brilliancy.

Fortunately such an extreme view shows the usual fate and merit of all extreme views in that out of the extremity there remains a workable precipitate which may be followed with safety. Causal efficacy of the factors involved in the determination of adult character will of course vary endlessly; now it will be given to heredity, now to environment. As illustrative of the emphatic, though by no means representative of the extreme view referred to, insistence on the hereditary factor, the views of A. J. Rosanoff³ are quoted. Speaking of the alcoholic adult character he says:

How does one become an alcoholic? The prevailing view is that through example, or suggestion, or by way of sociability, one is initiated and eventually habituated to the use of alcoholic beverages in gradually increasing amounts.

³ Lecture given before the Psychology Club, Ohio State University.

This is true as far as it goes; but it is equally true that under *any given conditions*, favorable or unfavorable, some persons will and others will not become alcoholic; the difference is between the persons. A great many can drink and even drink to excess without becoming alcoholic, in the specific sense of the term.

To become an alcoholic one must not only drink alcoholic beverages; one must be "alcoholizable." Being "alcoholizable" seems to consist of a constitutional weakness, derived from *bad heredity*.

Heredity, therefore, is not only the direct essential cause of probably two thirds of all cases of mental disorder, but is indirectly responsible for most of the alcoholic cases as well.

Bad heredity is thus the cause of causes, and upon it must be concentrated the bulk of preventive effort.

Among the measures that have been advocated for the prevention of bad heredity, the most important are restriction of marriage, sterilization, and segregation.

Segregation is not only practicable, but also effective; and we are justified in telling our legislatures that mental health is purchasable; mental disorders can be reduced by dollars and cents spent for segregation in this generation.

The mental disorders now prevailing amongst us are the heritage of untold generations of neglect of segregation.

The views of Rosanoff are extreme, but not of the extremist to which I have referred.

The apostles of the extremist view when confronted with the practical question, What is your prescription for the betterment of mankind? What is your recipe for the development of responsible human behavior? replies that the 'gladdening oil' must be put upon the 'squeak' far below the stage of adult existence. The source of human supply, the procreative function, is the fulcrum under which the lever of human uplift must be applied. Sentiment and sympathetic bosh must give way to cold calculation which rests on eugenic authorities if race recruiting is, in the main, to be other than from submerged families. Organized charities and corrective agencies alleviate those 'damned into existence' but in no wise prevent the constantly recurring 'damnation.' From the non-emotional point of view there is here "much sweetness wasted on the desert air."

There is no surcease from this stream of sorrow until the "legislative representatives of all the people" seek guidance from eugenic authority for the enactment of remedial legislation to prevent the propagation of those predestined to give steady employment to the 'social uplifter.' Until such legislation becomes operative social betterment can only be of the temporary variety, that is, only for the existing crop of social derelicts. Social alleviation under existing laws and conditions is literally an endless process of bailing out the boat without

stopping the leaks. The increase in crime and irresponsibility generally would seem to indicate that in no distant future the leakage in bids fair to exceed the bailing out. In Ohio, according to recent statistics, the jail population in the decade 1906-1916 increased to the disquieting extent of 42.0 per cent.⁴

The second view, namely, the absolute efficacy of environment, is obviously so obsolete in responsible scientific circles that it may be dismissed without further consideration. This view, like the preceding, view fails to avoid the 'falsehood of extremes.'

If we adopt the third view, the position that behavior is the joint product of native endowment and acquired responses, we find not only individual, but collective, responsibility as well. It is then that the 'tail' of behavior goes with the 'hide' of inheritance and experience. This view is a compromise conclusion between the strict hereditarians and eugenicists who insist that immediate conditions control the destinies of men.

The compromise position maintains that the first essential to responsible behavior demands that every infant shall be well born, free from the heavy hand of incurable diseases which, with fatal surety, ring the death knell of efficient if not honorable existence. Important as is the factor of birth, no one except the restricted group to which I have referred, I think, would maintain that desirable birth is a safe insurance against irresponsible behavior; beyond affording a secure foundation for character formation no social virtues perhaps can be claimed for it.

The fact to be emphasized here is that a desirable hereditary soil is but a part of the problem of responsible behavior. That this is not the whole of the problem becomes clearer when it is remembered that the weeds of irresponsible behavior also thrive and strike deep their roots in such a soil. Witness the unconvicted, expert, intelligent criminals in certain of our professions. The terms 'shyster' and 'quack' readily suggest themselves. These social weeds are not indigenous to imbecilic or even moronic soil. It is equally important that every child be well reared. This is, in part, society's function. No one, I think, would seriously maintain that the rise and fall of past civilizations, in any other sense than contributory, are results of feeble-mindedness, nor, I think, will it be seriously maintained, unless normality has disappeared, that the fifteen (more or less) men who two and three fourths years ago

⁴ T. H. Haines, "The Increasing Cost of Crime in Ohio," p. 8.

plunged the entire world into an unparalleled sea of blood and sorrow, depriving thousands of helpless babies of their feeding-bottles, were irresponsible because of congenital, incurable diseases. Nor does it seem probable that the greatest dangers which may befall our great republic lie in the irresponsible conduct of our feeble-minded population. One so-called responsible, well-bred (not well-educated) directing head of an influential metropolitan newspaper, or a glib-tongued, self-seeking, not-very-near statesman may rock the underpinnings of society far beyond the combined influences of an entire state's population of derelicts. This, the most dangerous form of irresponsibility, is a plain matter of brain organization. The brain considered prior to formal organization is endowed with certain powers and capacities—inborn traits—which through environmental conditions become specific habits of response. What the schools or any other social agency probably can not do at all is to create intellect, to create capacities; the most that may be expected by any form of environmental influences and conditions is to determine the channels in which innate intellectual traits shall become specific. In other words, how a normal human being specifically behaves depends upon the after-effects which environmental forces leave in the bodily tissues, more especially the nervous tissues. The ethics of an individual probably does not transcend the bundle of habits acquired by outward agents impinging upon the sense-organs and originating nerve-currents which channel their way, as it were, through the brain to the muscles. The effect of such a process by virtue of the extraordinary plasticity and retentivity of neural tissue remains a permanent possession of the body so long as the tissues endure. Any line of print or talk falling upon the eye or ear-gate leaves its indelible, ineffaceable imprint and becomes a lasting determinant of conduct. The sum total of these determinants grouped and classified into more or less specific habits of greater or lesser degree of perfection constitutes and circumscribes character.

The entire body seems to be made over, seems to undergo a molecular readjustment by the kind of environmental nourishment to which it responds. Carpenter³ long ago pointed out that the organism grows to "the mode in which it is habitually exercised." It is proverbial that this 'growing to' process, this organization of the brain to respond in definite ways, takes place most readily during childhood when the bodily tissues are extraordinarily plastic and retentive. It is clear that early

³ "Mental Physiology."

anti-social brain-organization gives rise to pitiful attempts at reformation later. Carpenter goes on to say that what is early learned "becomes branded in (as it were) upon the cerebrum; so that its 'traces' are never lost, even though the conscious memory of it may have completely faded out. For, when the organic modification has been once *fixed* in the growing brain, it becomes a part of the normal fabric, and is regularly maintained by nutritive substitution; so that it may endure to the end of life, like the scar of a wound."

The late William James⁶ in his incomparable style expresses the results of Carpenter's 'growing to' process as follows:

It (habit) alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor. It alone prevents the hardest and most repulsive walks of life from being deserted by those brought up to tread therein. It keeps the fisherman and the deckhand at sea through the winter; it holds the miner in his darkness, and nails the countryman to his log-cabin and his lonely farm through all the lonely months of snow. In most cases, by the age of thirty, the character has set like plaster, and will never soften again.

Again James says:

The hell to be endured hereafter, of which theology tells, is no worse than the hell we make for ourselves in the world by habitually fashioning our characters in the wrong way. Could the young but realize how soon they will become mere walking bundles of habits, they would give more heed to their conduct while in the plastic state. We are spinning our own fates, good or evil, and never to be undone. Every smallest stroke of virtue or of vice leaves its never so little scar. The drunken Rip Van Winkle excuses himself for every fresh dereliction by saying, "I won't count this time!" Well, he may not count it, and a kind Heaven may not count it; but it is counted none the less. Down among his nerve cells and fibers the molecules are counting it, registering and storing it up to be used against him when the next temptation comes. Nothing we ever do is, in strict scientific literalness, wiped out.

Pathological cases are not wanting which indicate that the brain is endowed with this extraordinary degree of retentivity and that every sense stimulation reaching the brain leaves its undeniable trace there. Some of these impressions seem to sleep in the brain tissues like the camera's picture sleeps in the collodion film to be revived only by unusual conditions of cerebral disease or accident. The case cited by Coleridge and quoted by Carpenter and James is illuminating.⁷

In a Roman Catholic town in Germany, a young woman who could neither read nor write, was seized with a fever, and was said by the priests to be possessed of a devil, because she was heard talking Latin, Greek and Hebrew. Whole sheets of her ravings were written out and found to

⁶ "Principles of Psychology," Vol. 1, pp. 121, 12.

⁷ "Principles," Vol. 1, p. 681.

consist of sentences intelligible in themselves, but having slight connection with each other. Of her Hebrew sayings, only a few could be traced to the Bible, and most seemed to be in the Rabbinical dialect. All trick was out of the question; the woman was a simple creature; there was no doubt as to the fever. It was long before any explanation, save that of demoniacal possession, could be obtained. At last the mystery was unveiled by a physician, who determined to trace back the girl's history, and who after much trouble, discovered that at the age of nine she had been charitably taken by an old Protestant pastor, a great Hebrew scholar, in whose house she had lived till his death. On further inquiry it appeared to have been the old man's custom for years to walk up and down a passage of his house into which the kitchen opened, and to read to himself in a loud voice out of his books. The books were ransacked and among them were found several of the Greek and Latin Fathers, together with a collection of Rabbinical writings. In these works so many of the passages taken down at the young woman's bedside were identified that there could be no reasonable doubt as to their source.

These principles of growth so forcibly set forth point with unmistakable clearness the way to social reconstruction; they constitute common grounds of procedure for all except a negligible minority of extreme eugenists and euthenists. What then are some of the implications involved in the frank acceptance of the doctrine that adult human beings are the result of a 'growing to' process and that the final result of such a process is a number of fixed habits of conduct which habits become the major premises of behavior?

First, society must curtail the procreative function, eliminating the future presence of infants which beyond a reasonable doubt are incapable of 'growing to' stable manhood. This means the elimination from Ohio alone of several thousand helpless dependents, absolute charges who carry not so much as a fraction of their own load in the world. Moreover this gains enormously in significance when such elimination would divert annually several millions of dollars to the 'growing to' process for infants relatively free from the handicap of incurable diseases. This by no means eliminates the 'hewer of wood and drawer of water' type, but it does signify the rejection of those who are unable to 'hew and draw' their own sustenance. Wisdom would seem to dictate the adoption of the eugenic program of elimination. The program is everywhere conservative, free from weak sentimentalism, impassionate and has the force of science behind it. Our mistaken notion of personal liberty has led us into the grievous error of permitting this problem to solve itself. Dr. Terman⁸ in a recent article sounds the following warning:

The problem is not one that can be left to its own solution, because there is no solution short of positive state action. The longer the menace

is neglected, the more threatening it becomes. In the last few decades the rate of reproduction among the socially fit has rapidly declined, but the feeble-minded continue to multiply at an undiminished rate. At the same time very beneficent social agencies and organized charities, necessary and humane as these are, nevertheless often contribute to the survival of individuals who would otherwise not be able to live and reproduce. The result is an ever-increasing proportion of socially unfit individuals in our state's population, and the problem can be met only by such an extension of the state's care of the feeble-minded, particularly of the high grades of feeble-minded, as will curtail the reproduction of defectives.

Second. The 'growing to' process does not admit the introduction of an unseen, transcendental power in the determination of human conduct. It is true that the brain may be organized, may 'grow to' the most absurd beliefs in anthropomorphism, if only the outward agents are favorable. Such beliefs, however, are habits and as such become vital determinants of behavior, but this must not be construed to mean that some superhuman agent steps in and makes decisions or choices by actually moving muscles. All beliefs are habits and their values in the final analysis must stand the test of character—do they or do they not sustain society? Measured by the pragmatic criterion alone, it would perhaps not be difficult to make out a case for our common species of revivals; especially is this true when it is remembered that most of the children of men have not paid the price to understand science and philosophy as they bear on this important question. Anthropomorphic habits, pierced by scientific and philosophic insight, as a rule, become inoperative. Certain of this class of habits are to my mind little short of pernicious. Reference is particularly drawn to the fatal notion that youth may sin with impunity and that at a more convenient hour a beneficent cleansing may be had for the asking. This is Rip Van Winkleism par excellence. "Nothing we ever do is, or ever can be, in strict scientific literalness, wiped out." Human behavior is a joint product of the interaction of inward and outward forces; the visible effects of such interaction are habitual modes of response. Could youth but realize that each experience leaves forever its unimaginable touch on the brain, that it is engraved there as with a steel stylus, they would give more heed to their conduct while in the plastic state. This simple incontestable truth does not seem to have seriously possessed many of our educational leaders, much less, therefore, the teachers who are in the more immediate presence of the brains of children. It seems to be asking too much of our educators and social workers to know even in a general way the architecture of the body, the system of peripheral and

* "Feeble-minded Children in the Public Schools of California."

central wiring which is the very foundation of behavior so long as the weighty problem of making one box of chalk do the work of two or how to save an adult derelict remains unsolved.

Third. *What* the organism 'grows to,' *what* habits the adult finally possesses, is largely of society's making. We may fairly ask then what are some of the harmful outward social forces which leave their ineffaceable effects in the nervous system, which effects then become determinants of human behavior. No need to recount all of them! the list is as long as it is wearisome; then too we have lived in the midst of these baneful social agencies so long that the average human being becomes so completely adapted that he is as likely to be cognizant of them as he is of his own shortcomings. Need I mention the gun-toting scenes with their inflammable red setting, the scenes depicting man's inhuman treatment of womankind now so common in our melodramatic movies? The inevitable result of this form of brain 'branding' is practical enactment of similar scenes in real life. Corroboration of this point of view is not lacking in the courts of domestic relations and in juvenile delinquency. Not without reason do we find waves of crime with greater frequency and higher crests in our republic than in the more stable European lands. In one crime, perhaps the crime of crimes—the crime of war—Europe stands without a peer. The whole world bleeds and is in sorrow to-day because each European nation has insisted for many generations in organizing the brains of its citizens to look with suspicion, envy and even hatred upon the citizens of neighboring states. Fratricidal tendencies have thus been nurtured in the greenhouse of the brain and now these tendencies have ceased to be such and become actualities. Need I mention the flood of devitalizing, spineless, mushy reading which annually soaks the brains of thousands of young girls and effeminate boys and this at a time when the tissues are most plastic, most retentive? Great gobs of sobbing situations are written into the nerve cells, fibers and molecules and there maintained by 'nutritive substitution' as long as the body endures. Need I mention the eye and ear stimulations which emanate from the open saloon, from dens as varied as the tints and shades of spectral colors, from the line of talk common to our side-street pool rooms and dance halls? Think of this collection of social stimuli; think of them finding permanent lodgment in the molecules; think of society placing such a menu in the hands of juvenescent, romantic youth and he who runs may understand the genesis of a large fraction of irresponsible behavior in the world. Need I add to

this collection that fraction of the daily press which with zeal and devotion worthy of a nobler cause regales the public hunger with recitals of human weaknesses and frailties? How often do the Magdalenes, of high or low degree, occupy the headlines! As Thackeray so well says:

Who would meddle with dull virtue, humdrum sentiment, or stupid innocence, when vice, agreeable vice, is the only thing which the readers of romance care to hear. (In "Henry Esmond.")

When it is remembered that the daily sheet constitutes the main reading diet of a large percentage of families and that these families are important race-recruiting centers, then the brain organization effected by this medium assumes no inconsiderable importance. It is no psychologic dream or piece of sentimental fiction to charge three national tragedies to the malignant influence of an irresponsible press. The collective effect is far from social assassination. And now we find this invidious yellow creature invading England, where bloom the choicest flowers of modern journalism. Two classes of people escape this form of brain 'branding'—those who can not or do not read and those who, in the interest of mental hygiene, quarantine their homes against this modern plague. Need I mention the softening effect on character attending excessive indulgence in fictitious joys and sorrows enacted on the modern stage? James^o says,

Every time a resolve or a fine glow of feeling evaporates without becoming practical fruit it is worse than a chance lost; it works positively to hinder future resolutions and emotions from taking the normal path of discharge.

Weeping over fictitious situations may actually inhibit weeping over a real situation, so thoroughly does the brain 'grow to' the mode in which it is exercised.

The remedy would be never to suffer one's self to have an emotion . . . without expressing it afterward in *some* active way.

Heraclitus is said to have been perpetually weeping on account of the vices of mankind. Contrasting with Heraclitus is Democritus, the Laughing Philosopher, who is said to have made jests of the follies, sorrows and struggles of mankind. The modern Heraclitus, the Weeping Philosopher, fulfils his lachrymous duties most readily when human sorrows, struggles and follies are presented in fictitious personages. A Democritic attitude would be far less fatal and may be constructive

^o "Principles," Vol. 1, p. 125.

in its effect if the 'glow of emotion' aroused by a given fictitious situation leads to some response noble in character.

From the foregoing we may conclude that the problem of character formation, the development of responsible human behavior, demands (1) that society shall have a voice in determining with what kind of brain the human infant shall begin his struggle with the environment and (2) what outward agents shall determine the direction of its organization. Now, brain organization from this point of view covers what is commonly denominated as *will*. In the popular mind *will* is something free and indeterminate; from one point of view will is determinate, entirely a product of innate tendencies operating in an environment. In a somewhat narrow sense, will, in all likelihood, has no existence outside of acquired habits and the conflux of those habits. So-called strong wills are results of certain virile tendencies which, through the ministration of a favorable environment, have issued into habits which dominate all other tendencies to response. If environment fashions voluntary behavior out of general innate qualities, then man may be said to possess wills rather than will, the variety being co-ordinate with the more or less habituated responses. For this reason the same human being may reveal unflinching integrity and probity in meeting financial obligations and scandalously betray the municipality, state or the nation. The bundle of habits of which we are composed appears to be specific. Man's architecture is initially, *i. e.*, in infancy, singularly vague and general while in adulthood we find man more or less completely fashioned to act slavishly, irresistibly according to the mode of behavior which innate tendencies and environment have forged into habits. The belief in free will, a capricious, lawless, causeless, transcendental force, is itself a habit; the tenacity with which it is held is a fair measure of the extent to which the habit has become ingrained.

The 'growing to' process of which we have now so frequently spoken finds its terminus then in habits which constitute the very essence of behavior responsible or otherwise. Moreover it is not too sweeping a statement to say that the entire growth of human behavior comprises responses in varying degrees of habituation. No one, I think, would seriously maintain that our theologies are inherited; on the contrary they are acquired possessions like the multiplication table. Consequently we find the Baptist worshipping according to the appropriate baptismal tenets not because from the first he can not help doing so, as the cat pursues the mouse, but because his

brain has received the baptismal treatment. In other words, our beliefs are habits which probably differentiate but little with respect to values. It is not the purpose of this paper, however, to place values upon acquired responses; it is rather our purpose to trace the genesis, the ontogenetic evolution of behavior, whether responsible or irresponsible, efficient or inefficient. Upon society must rest the onus of a large percentage of irresponsible behavior; society pretty largely must answer for the crowded dockets of every link in the chain of our courts so long as 'soft pine' brains are permitted to multiply with abandonment and so long as sound brains run the open gauntlet of all forms of vice which are permitted to flourish with impunity. Each item on the docket is largely of society's own making and in the manner already indicated; each individual conviction is an indictment of society, in so far as each offender is in no wise responsible for the brain he possesses and only in part responsible for such organization, such 'branding' as it receives. In a very true sense society and more especially the intellectually *élite* is on trial.

By permissive negligence of society, an inmate of an asylum, or other detention institution, is more sinned against than sinning. The total institutional population is a fair inverse index of social health. Organized agencies for human alleviation is society's intuitive method of repentance.

Huxley observes that man has made no physical progress since the days of recorded history. To this, in view of recent European events, let us add the lack of certain aspects of moral progress. The remedy now at hand seems to rest on a detailed empiricism of modern science which, acting in conjunction with the speculative disciplines, offers the chief hope of man's physical and moral redemption. This remedy involves a frank acceptance of an *uncompromising* scientific puritanism. This newer puritanism will insist on the following: (a) Purging the human stock of strains congenitally without hope, (b) reduction of individual license by stiffening governmental control, (c) reconstruction of beliefs by making them consonant with the generally accepted tenets of modern science and (d) insurance of responsible behavior by organizing the brains of children through adequate control of environmental agencies.

In conclusion let it be said that here as elsewhere responsible behavior depends more upon sound morals than anything else and sound morals are sound habits due to sound parentage and a wholesome environment.

NATURAL SELECTION AND THE SURVIVAL OF THE FITTEST

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IT is well known that Herbert Spencer, five years after the publication of Darwin's "Origin of Species," introduced the phrase "survival of the fittest" as an exact equivalent of "natural selection." He said:

The survival of the fittest which I have here sought to express in mechanical terms is that which Mr. Darwin has called "natural selection," or the preservation of favored races in the struggle for life.¹

It is also generally known, at least among scientific men, that Alfred Russel Wallace, co-discoverer with Darwin of the principle of natural selection, preferred Spencer's expression and urged upon Darwin the substitution of it for "Natural Selection," the ground of his preference being, not any difference in meaning of the two expressions, but the misconceptions that had arisen from Darwin's apparent personification of nature. He said, referring to Spencer's phrase:

This term is the plain expression of the fact; natural selection is a metaphorical expression of it and to a certain degree indirect and incorrect, since, even personifying nature, she does not so much select the special variations as exterminate the most unfavorable ones.²

And in the same letter from which the foregoing passage is quoted, he said,

Natural selection is, when understood, so necessary and self-evident a principle that it is a pity it should be in any way obscured; and it therefore seems to me that the free use of "survival of the fittest," which is a compact and accurate definition of it, would tend much to its being more widely accepted and prevent it being so much misrepresented and misunderstood.

Darwin replied:

I fully agree with all that you say on the advantages of Herbert Spencer's excellent expression "the survival of the fittest" . . . it is however a great objection to this term that it can not be used as a substantive governing a verb. I will use the term in my next book on domestic animals . . . the term natural selection has now been so largely used abroad and at home that I doubt whether it can be given up and with all its faults

¹ "Principles of Biology," Vol. I., Sec. I.: 65.

² "More Letters of Charles Darwin," Vol. I., p. 268.

I should be sorry to see the attempt made. Whether it will be rejected must now depend "on the survival of the fittest."³

He adopted the phrase, however, as an alternative expression of his own idea, and in the fifth and sixth editions of the "Origin of Species," as well as in some of his other books, it so appears. No objection was raised by him on the ground that it meant something different from "natural selection." Professor Huxley was not impressed, as was Wallace, by the superiority of Spencer's phrase. Writing of it in 1890 he said:

The unlucky substitution of "survival of the fittest" for "natural selection" has done much harm in consequence of the ambiguity of "fittest" which many take to mean "best" or "highest"—whereas natural selection may work towards degradation *vide epizoa*.⁴

But Huxley, no more than Wallace or Darwin, said anything to indicate that the two phrases are not identical in meaning and interchangeable, and they have thus been used by writers generally on the subject of evolution.

And yet there is a very important distinction between "natural selection" and "the survival of the fittest." Briefly it may be said that natural selection is a process while the survival of the fittest is a result; the one is a principle of limited application, the other a universal law.

Natural selection would obviously be powerless without something to select and something to reject and, although the selection is unconscious, it implies also a mode of selection. Natural selection, then, involves, first, a plurality of objects to select from, and these are presented in the organic world through the immense fertility of living things. In the second place, there must be variations in structure or function, or differences in the environment; and, in the third place, there must be a struggle for existence, at least in a metaphorical sense. Given these circumstances, the survival of the fittest naturally results. Of course if the selection is to have a cumulative effect, that is, if it is to be progressive or regressive, the element of heredity must also come into play. Natural selection, then, as a process, includes five elements, namely, the multiplication of chances, variation, struggle for existence, heredity, survival of the fittest. The survival of the fittest is the result of the operation of all the other factors. Another outcome is the elimination of the unfit, and it would be just as correct to identify natural selection with the elimination of the unfit as with the survival of the fittest.

³ *Op. cit.*, pp. 270-1.

⁴ "Life and Letters of Thomas H. Huxley," Vol. II., p. 284.

But this distinction between natural selection and the survival of the fittest, although valid, is not especially important. The whole is often named by a part, and to call the process of natural selection by its result is a permissible form of synecdoche. The same may not be said, however, of the distinction I am now about to point out, for it is both valid and important. It is the distinction previously referred to in the statement that natural selection is a principle while survival of the fittest is a law.

A law, in the scientific as distinguished from the legal sense, is a statement of the coexistence or sequence of phenomena as they are manifested to our senses. Observation and generalization are alone sufficient for the formulation of a law. Since a law expresses the uniform operation of a force, our knowledge of the uniformity enables us to control the direction of the force, and this is done by the application of some principle. The essential distinction between a law and a principle has been clearly brought out by Professor Lester F. Ward. He says:

A law is the general expression of the natural sequence of uniform phenomena. It states the fact that certain phenomena uniformly take place in a certain way. It takes no account of cause, but only of the order of events. A principle, on the contrary, deals wholly with the cause, or, perhaps more correctly, with the *manner*. It is the *modus operandi*. It has to do with the means or instrument by which the effects are produced. It is essentially an ablative conception. As principles deal with causes they must deal with forces. Gravitation, for example, is a force, but it operates in a regular way which we call the law of gravitation. Its various applications are principles or utilize principles. Thus the weight of water is a force, but the different kinds of water-wheels act on so many different principles—overshot, undershot, flutter, turbine, etc. The turbine wheel, for example, acts on the principle of reaction, according to Newton's third law of motion that action and reaction are equal and opposite. Other applications of the law of gravitation are those of weights, the balance, the pendulum, etc., all of which involve different principles. Water and steam expand by heat according to a certain law. This expansion of steam is a force which has been utilized by means of a number of mechanical principles—the piston, the cut-off, the governor, etc.⁵

Now, prior to the discovery of natural selection by Darwin and Wallace, Spencer, for one, had formulated the law of evolution. In his essay on "Progress, its Law and Cause," published in 1857, he showed that the law of organic progress consists in a change from the homogeneous to the heterogeneous, and that the law of organic progress is the law of all progress. The law of evolution, then, was recognized

⁵ Ward, "Pure Sociology," Pt. II., Ch. X., pp. 169-70.

and formulated before any one knew the principle of its operation. Spencer himself erroneously thought that, so far as organic evolution is concerned, it was functional modifications. Darwin and Wallace, however, explained the law through the discovery of its true principle. Thus Professor Ward remarks:

Evolution is a law, or takes place according to a law, the phenomena succeeding each other in a definite order of sequence. We observe successive phenomena and from them deduce or formulate the law. But natural selection is a principle. It teaches how the effects through observation are produced.⁶

Now it must be perfectly clear that, considered as a principle natural selection explains only a limited range of phenomena, namely, the phenomena of selection that are independent of conscious choice. It applies to germinal selection, physiological, sexual, and organic selection, but it does not apply to the phenomena due to the conscious agency of man in modifying the processes of nature. Here another principle applies, namely, artificial selection. But the law of the survival of the fittest applies to artificial selection as well as to natural selection. It is universal. The fittest always survive.

That this wider significance of the expression "survival of the fittest" is not generally appreciated is shown by the frequent assumption or declaration by writers on social questions that in modern society it is not the fit but the unfit which survive. Often in contrasting the operations of nature with those of human society it is asserted that the difference between the two lies in the fact that nature favors the fit while the opposite is true in society. In war, for instance, it is said that the unfit survive while the fittest are destroyed. But in war strength, courage, and the other fighting qualities are elements of unfitness for survival. Cowardice is at a premium. "He who fights and runs away will live to fight another day." Confusion arises from the ambiguity of the word "fit" or "fittest," as pointed out by Professor Huxley, fittest being mistaken for best. But always, in society as well as in nature, fittest means only best adapted to the prevailing conditions. Conditions, including man, determine the type. If conditions favor a higher type the fittest will be best and will survive, but if they favor a lower type the best will perish and the inferior will be preserved.

We have, then, in the "survival of the fittest" a universal law, a law which prevails in the organic world and in the social world, a law which is as rigid as the law of gravitation, and

⁶ *Op. cit.*

being thus invariable it indicates the possible control of social evolution through a recognition of the law. The necessary prerequisite of human improvement is the creation of conditions which favor a higher type of man and of society. Create these conditions and by the operation of this inexorable law the type favored by the conditions will come into existence and will survive. Progress is not, as Spencer says in the essay already referred to, a thing beyond our control. He says:

Progress is not an accident, not a thing within human control, but a beneficent necessity.

He is wrong on every point. Progress is an accident in so far as it takes place under the operation of natural selection. It is not a beneficent necessity, and just because it is subject to a great natural law it is within human control. If we learn enough about society to know what kinds of conditions are necessary to the survival of a higher type of society, and by intelligent effort bring these conditions into existence, the higher type will be ushered in and will survive. Knowledge is power with respect to social control exactly as knowledge is power with respect to the control of the mechanical forces.

RACE SUICIDE IN THE UNITED STATES III

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THE REASONS FOR THE HIGH BIRTH RATE IN THE COUNTRY

There is no need of dividing the rural population into classes in order to study the causes of the relatively high birth rate in the country. The great majority of people living in the country have incomes (counting what they use directly from the land) about the same as those in the comfortable class in the city. There are some people in the rural population who are really poor and there are a few who belong to the well-to-do and wealthy classes but these two extremes (not taking the negroes into account) comprise only a very small proportion of the whole. For this reason and also because I believe that all classes of people in the country, in spite of considerable differences in their incomes, think in much the same way regarding the size of their families, I shall speak of the farmer and non-farming rural population as belonging to a single class.

The women raised in the country have been trained to be home-makers. The changes which have been referred to above as unfitting many city girls to become good home-makers have not affected the country to any great extent. The country girl learns to help her mother about the home almost as soon as she can walk. There are numberless little tasks that she can do before and after school hours. If she happens to be an older child she gets training in caring for the younger children. She learns to make butter, care for the chickens, and to raise a garden as well as to cook and keep house. She never lacks for work about the home during vacations and after she has finished the country school. She grows up with the idea that her place in the world is to be a wife and mother. She never learns that the world offers almost numberless opportunities to women to do things outside the home. When the time comes for her to marry she knows what is expected of her and she is trained to the task.

The country woman who keeps house and does the work usually connected with housekeeping on the farm never needs to feel that she may be an economic hindrance to her husband

as many city women must. She knows, as her husband too often does not, that she is helping to make the farm pay. Her garden and chickens and butter and her daily economies constitute a positive contribution to the welfare of the family greater, in all probability, than that of many city women who work outside the home. A farm is commonly a partnership affair on its producing side, but as in most other industries the "boss" is able to distribute the product according to his desires rather than in accordance with the principles of justice.

The fact that the woman is such a direct economic asset on the farm probably accounts for the greater proportion of married women in the country and the earlier marriages there. Both of these things help to keep the birth rate in the country relatively high.

Children, too, are generally of economic value on the farm earlier than they are in the city. There are many kinds of tasks both for boys and girls on the farm which do not injure their health but which help to keep the work going smoothly. The bringing in of fuel, the care of calves and colts and pigs, errands to and from the fields, the assistance with the garden, all can be done by boys and girls, without injury to health, outside of school hours and during vacations. Besides the boy can even help with the field work by the time he is ten or twelve and be all the better for it, so long as he does little but drive a team hitched to light machinery. He can also help with the lighter parts of the heavier chores—the care of horses and cattle. The girl in addition to her chores outside the house can be of use to her mother in the house in a hundred ways and if not overworked will in no way be injured. I am fully aware that many country children are overworked and underplayed, but I do not believe that such a state of affairs is at all general. If it is, however, it only goes to prove that country people find children more economically valuable than I have supposed and are, therefore, more willing to have good-sized families.

In the country both boys and girls work at home by the side of their parents. Because of this they very soon learn that both father and mother are working for the same ends and that they are helping their parents to attain these ends. There is thus developed a unity of interest in the family in the country which is very often lacking in the family in the city. There is also less danger that the morals of the country children will be corrupted because of this close personal contact between parents and children while at work. I would not be understood

to say that, morally, all is as it should be in the country—far from it—but there is less chance that the average country boy will become utterly good-for-nothing than that the city boy will. I am quite convinced that the fact that parents and children spend much time working together in the country has a wholesome influence on the children in teaching them habits of steady application and thrift, while the fact that parents and children are together so little in the city has, in general, a demoralizing effect. This brings it about that parents in the country have less reason to fear for the future of their children and are therefore more willing to raise good-sized families.

Another way in which the unity of interest is developed in the family in the country is through the discussion of family affairs in the home. Most of the things that the farmer and his wife are interested in can be discussed with profit before the children. From the time the children are ten or eleven years old they can understand something of the problems of farm management and household management and they are also interested in what is going on in the neighborhood. In fact, the children very often have something to contribute that is of interest to the parents. Thus the whole family grows up within the same circle of interests and every member feels that he is included in any discussion or conversation that may arise. How different is the situation in the city! The business man comes home from the office or store with weighty matters on his mind and he finds it impossible to relieve himself by talking to the whole family, or even to his wife, because the thing absorbing his attention is highly technical. He finds his wife and children talking about neighborhood or school matters of which he knows little or nothing. So the family instead of being brought into closer unity by a mutual understanding of one another's interests is divided and the members may feel rather indifferent towards one another. Modern city life seems to me to have an increasing tendency to diversify the interests of the members of the family rather than to centralize them as rural life does.

Country life, therefore, makes it easier to keep alive interest in human beings than city life does. Definite personal interests—interest in wife and children, interest in school and church, interest in neighbors—take up a goodly share of the farmer's thought. He does not become engrossed with entirely impersonal matters as the city man is apt to. He must deal directly and humanly with people at almost every turn, while the city man deals more and more with *things* directly and

people only indirectly and technically. But even if the farmer becomes engrossed with things, *e. g.*, the extension of his acres, he yet hopes that he will have the children to help him till these new acres and to whom he can leave them, so that after all it is a family interest he is looking out for. I am quite certain that the more human and personal nature of the life of country people as compared with that of city people makes them willing to raise larger families.

Another reason for large families in the country is that it is easier to raise a good-sized family there than in the city aside from the fact country children early become an economic asset. The "barefoot boy with cheek of tan" is to be seen wherever one goes in the open country and usually his little sister is with him. The clothes may be soiled, the faces and hands dirty, but it is usually the "clean dirt" of the open country—the mud from the creek, the dust from the road or the stain of fruit and berries—not the foul slime from the gutter which one sees on the children in the poorer parts of our cities.

The country child always has a big playground at hand. In this playground are wagons and buggies, cultivators and plows, machinery and tools, cattle and horses, all of which call for careful attention and invite to manipulation. Many are the months and even years which the child can spend in playing with things which he will later want to use in his work.

If the children are not in the farm yard at play the mother may be quite sure that they are safe wherever they are. Besides, she knows all the neighbors' children and knows whether or not they are good companions.

The dressing of the children for school so that they will look respectable is not the trying task it often is in the city. Cleanliness and comfort are the two chief standards of respectability and they may be attained quite easily in the country. Colored dresses for the girls, with big aprons; overalls and blue shirts for the boys, with black stockings and heavy shoes for both, are sufficient for their requirements, and, for my own part, I think they look very well.

Furthermore, country children do not have the continual enticements to spend money that the city children have. They do not see the gaudy displays of toys and candies in the store windows on their way to and from school and, recently, the brilliant-colored lithographs of the "movies." If the country boy wants a sled he probably makes one, thus saving money and learning something useful. Country children learn to amuse

themselves rather than to ask papa for money to pay to be amused and this can not fail to relieve the country mother of much worry, because while amusing themselves around the home they are not very likely to get into much mischief. We must all agree, I think, that it costs less, in money, in work, and in worry, to rear a child in the country than in the city, and for this reason country people are more willing to rear them.

Moreover, the relatively secure economic position of the farmer makes him and his wife more willing to raise a good-sized family. The industrious farmer, either renter or owner, is practically certain of a fair living. Panics and hard times do not affect him as they do the industrial worker. Dissatisfaction of the capitalist manufacturers over a new tariff schedule does not throw the farmer out of a job nor render his living precarious, as it may the city worker. In fact the farmer is more or less immune from most of the disturbing conditions connected with modern industry. Of course, he occasionally loses a crop. But now-a-days when the farmer raises a number of different crops he very seldom has a total failure in all of them. For these reasons a farmer does not need to worry whether he will be able to feed and clothe his family, as many men in the city do. He can be practically certain that he will be able to meet the ordinary exigencies of life without a great deal of hardship to himself and his family. Because of this feeling of security of position the farmer has less reason than the city man to feel that he is giving irredeemable hostages to fortune when he has a large family.

We have seen that in the city many people limit their families because they feel they can not otherwise give their children the best opportunities. This motive to family limitation has very little influence in the country. The farmer generally regards his duty to the child as fulfilled if he allows him to complete the country school. He is quite sure that the boy who amounts to anything can shift for himself if he has a common-school education and has learned habits of steady application.

In the environment of the country most farmers come to believe that the schooling which was good enough for them is good enough for their children. They make no plans for the better education of their children which involve saving and preparing years ahead. This is not because the farmer does not want his boy and girl to have as good opportunities as other boys and girls, but rather because the only opportunities he

knows about are on the land and he does not see how an expensive education can help the boy to raise better crops. The average farmer little realizes how many opportunities are open to the young man with a good education which are closed to the one with only a common-school training because he knows little of modern city conditions. Therefore the farmer finds no reason to limit his family in the hope that he may thereby be able to give the smaller number of children an expensive training for their life work.

In the past, too, the farmer has known that there were good opportunities farther west if his family was too big to settle on the home place, and so he felt little anxiety over the future of his children. Even when the boy prefers to go to the city rather than to go west the farmer feels little doubt about his ability to compete with the city boy. He firmly believes that his boy can take care of himself wherever he may go. He also knows that the boy who works at home until he is twenty or more years of age owes him little economically for his "keep" and he does not feel that either his situation or the future situation of the boy would be much changed by rearing only a small family.

CONCLUSION

After this survey of the proportion of children to women in the different political units of the country and a study of the motives governing the birth rate in the different classes it may be well to ask: What conclusions can we draw regarding the conditions which, in general, favor good-sized families? and what is the outlook for the growth of our population in the near future?

In answer to the first question it seems to me the facts indicate that what may be called *frontier conditions* favor the rearing of good-sized families. By *frontier conditions* I mean not only pioneer conditions which exist when people are taking possession of new land, but all conditions in which people are accustomed to feel that there are good opportunities, easily available to their children—opportunities which require little if any special training in order to enable the children to do as well as their parents. Thus frontier conditions may exist even in the city.

Many poor immigrants in the cities feel that children should be and can be made economically valuable at an early age and with very little outlay on their part. That is, the standards of living are low, children are given comparatively little care, and they need no special training to get what seems to their par-

ents pretty good wages at some unskilled work. Thus they can contribute to the family income at a relatively early age and they can shift for themselves and do as well as their parents when the parents can no longer induce them to help to care for the rest of the family. I should consider some of the cities in the eastern and southern parts of the country, where there are many occupations open to children, as having more of frontier conditions than some of the cities in the middle west and west where there are very few industries in which children can be used with profit, *e. g.*, the manufacturing cities of New England would represent the former type, while Indianapolis, Kansas City, Denver and Los Angeles would represent the latter type. The rather high proportion of children in the urban population of some of the southern states may also be partly due to the frontier conditions in southern industry.

In the rural population, also, we find frontier conditions playing their part. States like Ohio and Indiana, in which agriculture is highly developed and is in a flourishing condition, but which were settled relatively early in the last century, have a smaller proportion of children than the newer states (except California). Abundance of land has meant open opportunity to the farmer's children. Even yet there is considerable opportunity on the land for those trained to make use of it. There can be little doubt that the farmer's children are the best prepared to take advantage of such opportunities as do exist. In the south there is still much land to be obtained cheaply and on reasonable terms. I have before me some booklets prepared by states and railroad companies interested in getting northerners to settle in the south. If only a third of the claims made by these people are true, the south is awaiting rediscovery at the present time. There is no doubt in my mind that the very large proportion of children in the rural districts of the southern and southwestern states is very largely due to the good opportunities for children to strike out for themselves at a relatively early age and do as well as their parents. We should always bear in mind, however, that where frontier conditions exist there is generally little knowledge of the means of voluntarily limiting the family. This is one factor, no doubt, in helping to keep the birth rate relatively high. But where the birth rate is high and frontier conditions do not exist—where opportunities for children are lacking—the death rate is usually so high that the proportion of children to women is rather low.

THE OUTLOOK FOR THE FUTURE

With the passing away of frontier conditions in the rural districts there is little doubt that the birth rate of the rural population will fall. It would not be at all surprising if the next census year would find several more of the great agricultural states of the middle west with about the proportion of children to women that Ohio and Indiana now have. And a few more decades will probably see the same movement in the whole of our rural population. But for the reasons given above in discussing the present high proportion of children to women in the country, I believe that the rural districts will always produce and rear more children than the cities.

The country is the natural place to raise children. Here they have opportunities for development and self-expression which I doubt ever being equalled by the cities with the best of playgrounds and schools. Besides, it will always be easier on the parents to raise children in the country than in the city. The care, the work, the worry and the expense of a child are less in the country than in the city and are likely to be so always. Even when the country gives the child much better educational opportunities than it now does this will still be true. It seems to me, therefore, that the country will continue to contribute the largest increment to the next generation by natural increase. I can see no danger of the newer immigrant stock "swamping" the older stock by natural increase so long as the newer immigrants remain city dwellers. There seems to be little chance that they will ever go to the rural districts in very large numbers. It might easily happen, however, that as the birth rate in the country becomes lower the newer immigrants would come to us in such large numbers, if unrestricted, that they would form the larger part of the increment to our population and in this way would become an increasing proportion of the whole.

It appears, then, supposing immigration should be effectually restricted, that the rural population is quite likely to continue to contribute the largest increment to our population, that the poor people in the cities will contribute the next largest, that the comfortable class follows next with almost the same rate of increase as the poor class and that the well-to-do and wealthy classes probably do not reproduce themselves. In the future the birth rate of the poor class is quite likely to fall as its members learn to restrict the size of their families, but the rate of natural increase will not fall proportionally because the lower birth rate will be accompanied by a lower death rate.

The same thing is also likely to happen, although not in so pronounced a manner, in the comfortable class. But there is good reason to believe that both of these classes will continue to contribute to the population in about the same proportion as at present.

The really important question for us, then, is: Is it eugenically desirable that our population should continue to increase as at present (leaving aside the whole question of increase through immigration)? Are the people with best capacities increasing most rapidly and those with least ability least rapidly? Unfortunately we can not answer this question as definitely as we should all like to have it answered, but certain facts seem to stand out quite clearly when we turn our attention to this matter.

I think that most people who are acquainted with our rural population would agree that in general it is of good stock. Most of the people are hardy, energetic and of good habits. The average of ability is good. There are, of course, many degenerate families and neighborhoods in the country, but these embrace only a small proportion of the rural population. Moreover, it does not seem likely that the selective action of the cityward movement of population has seriously affected the general level of capacity of country people, except, perhaps, in some of the older states, *e. g.*, New England. Therefore, the rather rapid rate of increase of the rural population is eugenically a desirable thing, for it adds an increasing proportion of good sound stock to our population. It is a movement in our population which should be encouraged and which we hope will be maintained in the future.

The poor class in our cities, which is adding the second largest increment to our population, probably contains more undesirable stock than any other class. I do not mean that this class as a whole is undesirable, but merely that the proportion of people in it who are of less than average ability is larger than in any other class. Being poor is not *prima facie* evidence of lack of ability, but people who lack ability, who are indolent and generally good-for-nothing, are quite likely to drift into the poor class in the city. Some means should be found of separating the desirables from the undesirables. The former should be encouraged to rear fair-sized families and the latter should be prevented from having offspring. The general rate of increase of this class is not too high, but we should try to see to it that the really incompetent become wards of the state and are not allowed to contribute to the increase of this class.

The comfortable class in the city is of much the same general ability as the rural population, and its rate of increase is fair. It should be encouraged to keep up its present rate of increase, because it contributes a good average of ability to the population.

The well-to-do and wealthy classes have, in my judgment, a higher average of ability than any of the other classes and are not contributing anything to the natural increase of the nation. In the process of selection through competition, people of ability tend to rise out of the lower classes into the higher and thus the upper classes come to have a relatively high average of ability. The very fact that a person can adapt himself to the conditions of life demanded by the change from one class to another seems to me to be proof of more than average ability. Of course, we must remember that many people are born into these classes and have shown no personal qualities which would entitle them to membership. But, even so, ability is, in all probability, inherited as other qualities are and it is, therefore, inherently likely that the son of a father of good ability would have more native ability than the son of a father of only moderate ability.

I can see no proof that good ability is not inherited in the examples of children of good families who have gone to the bad which are so often cited in this connection. In many cases it is probably not lack of ability which causes them to go to the bad, but lack of proper training. Only too often the child of the upper classes is exempt from the discipline and training essential to develop good qualities of character. All the latest developments of the science of heredity seem to me to point to the conclusion that the capacities of the parents are transmitted to their offspring, either in the first generation or in more distant generations, with little or no change. Therefore, if it takes good ability, as a general thing, to get into the upper classes, this good ability should be transmitted to children. Members of the upper classes, as a whole, whether they have risen by their own efforts or were born into these classes, should have more than average ability.

It should be born in mind that we are considering the average of ability in these classes, for there are no doubt many individuals who are of very ordinary ability. The proportion of people who become members of these classes by the merest chance, without any effort or merit of their own (aside from those born into these classes), is considerable. Then, too, sometimes the qualities which make for success are not socially

desirable qualities. Ruthlessness, callousness, indomitable ambition, selfishness, greed and brute force often make for financial success. I presume that few people would be anxious to see such qualities propagated or would consider their possessors of a high type. But in spite of the presence of many people with undesirable qualities in the upper classes I believe that the average of ability in these classes is higher than that in other classes.

If it is true that there is a greater proportion of people of high ability in the upper classes than in any of the others it is a calamity that they do not have as large a rate of natural increase as other classes. As the situation now stands, there is much truth in the statement that a democracy is likely to lead to race depletion. Our country offers excellent opportunities for advancement to men and women of unusual ability, but it seems to be moving towards race depletion, because those who rise to the top scarcely propagate themselves, to say nothing of adding to the numbers of the population. There is considerable reason to think that some of the best ability in the nation is being used up and not replenished because the upper classes have such small families or no families at all.

We need people of courage and earnest purpose in the upper classes to take the lead in a simplification of the standards of living and to uphold eugenic ideals, ideals which will lead them to sacrifice some present pleasure and perhaps undergo some definite hardships in order to leave offspring well equipped by nature and by training to carry forward the world's work. And their offspring should be numerous enough not only to replace themselves, but to add a moderate increment to their numbers in each generation. It is not enough that two children should be born in a family in order to keep up the numbers of the class, to say nothing of increasing the numbers. I have estimated that from 3.5 to 4 children must be born to each married couple in the nation in order to keep up the numbers of the population. In the upper classes, where the death rate is low, it might appear that an average of 3 children would be sufficient to keep up their numbers. But when we take into account the facts that (1) late marriages from which not more than one or two children can be expected are common in these classes, (2) celibacy is greater here than in other classes, (3) necessarily sterile marriages are probably more numerous than in other classes, it seems doubtful whether the numbers of these classes can be maintained with less than 3.5 to 4 births in the normal family.

In order to have a fair rate of increase in these classes, then, there should be an average of about 4.5 to 5 children born in the normal family as conditions now are. If the death rate of this class is lowered the number of children needed would be somewhat less, but not much increase in the rate of growth can be expected from this source, as the death rate in this class is already quite low. Then, too, the development of eugenic ideals in the upper classes should make it unpopular for the man fitted to be a father to remain a bachelor simply because it is the easier life. If more members of the class undertake to do their full duty by the next generation there will be more normal families in proportion to the number of persons in these classes, so that the burden on each married couple will be somewhat lighter.

Our most serious population problem at the present time (leaving aside the question of immigration) is the problem of utilizing the ability of the upper classes in this generation and having it preserved in their offspring for coming generations. I have a very high opinion of the capacity of the people in the lower economic classes. I believe that there is much ability in these classes equal to that of the better quality in the upper classes, but the process of using up the talent of a man or woman in one generation can not go on indefinitely without tending to lower the level of national capacity.

We need to develop a pride of family and of achievement in the upper classes so that they will feel it a part of their achievement to rear children to carry forward their work. We do not want to see family pride become arrogant, we do not want family pride to be based solely upon the height of the ancestral tree, we want it to be based upon achievement making for a wholesome and refined national life. When we have family pride of this type we can not have too much of it. It will inspire anew in each generation lofty ideals of honor and service. It will lead to the rearing of families of moderate size and will dictate their training so that they will be a joy to their parents and a power in directing local and national life into ever higher channels.

CLIMATIC INFLUENCES ON AMERICAN ARCHITECTURE

By Dr. ANDREW H. PALMER

FELLOW, AMERICAN GEOGRAPHICAL SOCIETY

FROM time immemorial man has been interested in the weather, primarily because of its influence upon those things which support and sustain him—his field-crops, his fruit-trees and his cattle. Only within recent years, however, has a new emphasis been placed upon climate in that it has been studied from the point of view of its influence upon man himself. In approaching the element of climate as an influence on man, his immediate environment and his daily activities, a new and interesting vista is presented to view.

During the centuries when man was a wanderer on the face of the earth, he naturally found it to his advantage to remain in regions where the climate was hospitable. He did not long remain in inhospitable climates until he had learned to construct a shelter, and thus to provide an artificial climate, when that was needed. These shelters, crude and rudimentary at first, complex and variegated later, form in their evolution a parallel with the evolution of man himself. In fact, in the narrative of man's evolution, the chapter describing his domicile is not less important than those concerned with his literature and his art.

Additional centuries passed between the time man ceased to be a nomad and the time when he possessed a well-defined architecture. In the beginning, architecture was necessarily domestic, in that it was entirely concerned with a house as a dwelling-place. As civilization advanced, the field of architecture grew to embrace structures like the temple, the market-place and the coliseum. Moreover, races and periods developed systems peculiarly their own. As a result, we now recognize distinct features of architecture when we refer to the Gothic, the Romanesque, the Byzantine, the Egyptian, the Persian, or the Mohammedan. Since the beginning of the nineteenth century, however, we have a unique situation in that there is no universal or generally prevalent style. While this is true of the Old World generally, it is even more true of the New World.

We have no well-defined American architecture. Like many other things American, we can not speak of this in the singular. We have American climates and American architectures.

Numerous causes contribute to the great variety in building design in the United States. For a given type of building the more important considerations which determine the design are the natural environment and the building material available. Climate may properly be considered as a phase of the natural environment. As an influence in determining the design of large structures like hotels, office-buildings and apartment houses, climate is a subordinate consideration. Seattle office-buildings resemble those of New York, and San Francisco hotels are not greatly unlike those of Boston. In the domain of domestic architecture, however, that concerned with a detached building used as a dwelling-place, climate is a dominating influence. In the construction of our homes we have learned to adapt ourselves to our environment. Just as climate differs greatly in the various parts of the United States, so the type of home construction also differs. When design is left to the skilled architect rather than to a blundering mason or carpenter, results tell the tale. In this age of efficiency it pays to consult the specialist. Moreover, the technical-architect is in greater demand to-day than is the artist-architect. In home construction practical needs are more important than esthetic considerations, and comfort is preferred to display. Climate as a phase of natural environment determines the practical needs in no small measure. An enumeration of some of the climatic influences upon home design in the United States will be given in the following.

INDOOR AND OUTDOOR CLIMATES CONTRASTED

People live in houses partly because of the fact that there one can regulate the climate of his immediate environment. Indoor climate is therefore essentially artificial, as contrasted with outdoor climate. The advantages of such an artificial climate are principally those of agreeable temperatures having a small range, and shelter from precipitation (rain, snow, sleet, etc.), from wind and from the sun. But there are certain disadvantages not so easily recognized. Only a few will be mentioned at this point. Even in modern dwellings having the most improved ventilating systems, the air is not as well adapted for breathing purposes as is that in the open. Moreover, during the half-year when our homes are artificially heated the humidity of the air indoors is usually too low for

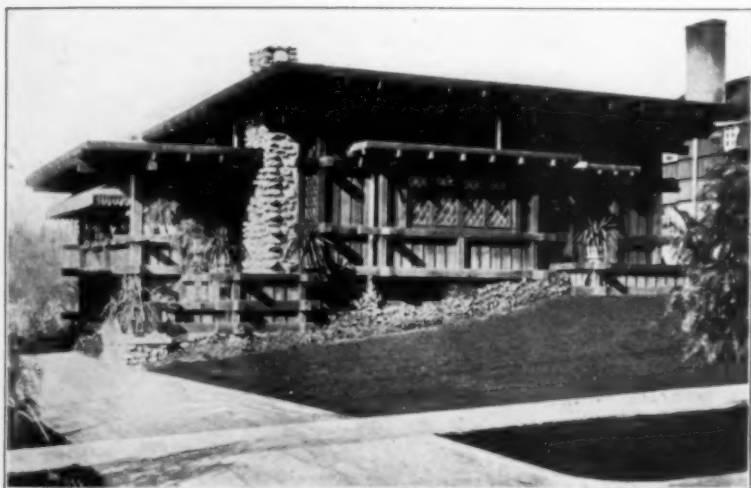
our needs. When out-door air is introduced into our houses through ventilation, and is then heated to a comfortable living temperature, its relative humidity is reduced unless water is added through evaporation. While dryness in the air is not of itself harmful, the individual passing quickly from air of moderately high relative humidity outdoors to relatively dry air indoors, or *vice versa*, is subjected to a greater change than the delicate membranes of his nose, throat and lungs can endure without injury. The result is nasal or bronchial catarrh. It is only a comparatively short time that the serious effects of deficient indoor humidity have been recognized, and thus far no device has been generally adopted to offset them. A fortune awaits the man who will invent and place upon the market a simple, inexpensive and unobtrusive humidifier. Thus far house plants and evaporating trays have proved partially effective in combating this evil. Other factors contribute to the unfavorable features of indoor climate, but those mentioned are the most important. Incidentally it may be stated that most of our rooms are kept too warm in winter. There seems to be a universal feeling that 70° F. is the correct temperature for the air in a living-room. But it has been shown repeatedly by various investigators that mental work is done to best advantage in temperatures nearer 60° F., and manual work at temperatures not much above 55° F. With the proper relative humidity, 60°-65° F. is a comfortable temperature for a living-room.

Contrasted with the artificial indoor climate, the outdoor natural climate presents many points of difference. As a result of modern scientific research it has already become a proverb that "no healthy organism is hurt by exposure to sunlight and the open air." Given proper clothing and freedom of movement, man can live out of doors over the larger part of the globe. One of the curious lessons taught by the Great War is the fact that throughout a large part of Europe man can live out of doors in winter as well as in summer. It is related that countless soldiers who formerly lived an in-door life have improved in health by spending a winter out of doors in the trenches. Modern cures for pulmonary tuberculosis are based largely upon the beneficial effects of out-door living. In Florida and in the Southwest, many people, both well and ill, live out of doors throughout the year. Moreover, few people "catch cold" while out of doors. The most frequent causes of colds are contaminated air, sudden temperature changes and draughts. Outside an enclosure the air is never contaminated,

and draughts out of doors are harmless to the person in good health.

CLIMATIC INFLUENCES ON AMERICAN HOME DESIGN

A large proportion of the American people now live in crowded conditions in the apartments and tenements of great cities. But the home which is generally considered the typical American home is that of a detached wooden, brick or concrete house, of five to ten rooms, two to three stories in height, surrounded by a yard containing lawn and garden, and situated in a small town or in the suburbs of a large city. Strictly from a climatic standpoint, wood for construction purposes has the



Courtesy of The National Builder.

A LOS ANGELES BUNGALOW. The veranda shown at the left of the picture serves as a living room which can be used throughout the year.

advantages of being a non-conductor of heat, and when painted is nonporous. However, it has the disadvantage of being insecure in a strong wind. Brick has all the advantages of wood, and is more secure in the time of storm. Concrete, the use of which is increasing rapidly from year to year, has the one serious disadvantage that it is porous, and admits moisture in humid climates. However, with the use of various preparations now on the market it can be made water-tight.

With reference to the size of the house, climate is considered by the architect because in winter it takes more fuel to heat a large house than a small one, while in summer a large house is kept cool more easily than a small one. For this reason the North Dakota cottage is usually small compared with



Courtesy of The National Builder.

A MODERN CONCRETE DWELLING IN EVANSTON, ILLINOIS. The sun-parlor shown in the foreground is on the south side of the building, and therefore receives the maximum possible amount of sunshine.

the Virginia mansion. The large manor-house of the South, having spacious, open rooms and wide hall-ways is well adapted to the long heated period. During the past decade the bungalow type of dwelling has become popular in the West. These are usually small, but one story in height, with the rooms so placed that they enclose an open courtyard. The man who first designed this last feature recognized the value of and the universal desire for life in the open. In southern California, where extremes of climate are unknown, the bungalow is little more than four screens, or side-walls, with a roof thrown across the top. Such bungalows, appropriately known as "canary cottages," answer every need for a habitation.

The thoughtful architect also considers climate in determining the height of the dwelling he is planning. Throughout most of the United States the summer half-year is a hot period. For this reason living-rooms and sleeping-rooms are not placed directly underneath the roof in the well-planned home. There is an open air-space above such rooms in the form of a second floor or attic. The cellar floor is usually below the surface of the ground outside, and since cool air is heavier than warm air the cellar is the coolest part of the home during the summer. In the modern dwelling the cellar is utilized for a summer study or workshop, whereas formerly it was little more than a store-room.

Even in planning the surroundings of a dwelling the architect now considers climate. The typical New England home is surrounded by shade-trees, is often vine-covered, and sometimes is invisible from the road but a few feet distant. As the foliage is absent in the winter, the desired sunshine is then secured, while in summer its shroud of verdure promotes coolness in the dwelling. In the Middle West, trees serve another useful purpose, in that they act as wind-breaks on the level, wind-swept prairies. Every one who has crossed Iowa has observed that a hundred or two hundred feet west of each farm-house is a tall row of trees, planted as close together as they will grow.

The exposure of the dwelling naturally suggests itself next. The climatic features the architect considers in planning the exposure of a contemplated structure are sunshine, wind and rain. Each of these factors deserves consideration.

Sunshine is the best natural germicide, both for the individual, as well as for his immediate environment. While the tanning of the skin by the sun, which some people strive so hard to secure at the sea-shore during the summer time, is of itself of little or no value, it is good evidence that the individual has spent some little time under healthful conditions. The sun helps him perhaps more than he realizes. Besides being a germicide, sunshine is also a nerve tonic. This is not true in tropical countries, but is true in an intermediate latitude like that of the United States. Moreover, sunshine promotes dryness, particularly when admitted into a building. In home design the ideals to be sought are sunshine which does not glare, and shade without draughts. Generally speaking,



Courtesy of The National Builder.

A DWELLING IN BUFFALO, NEW YORK, IN WHICH THE NATIVE LIMESTONE HAS BEEN UTILIZED TO GOOD ADVANTAGE. The wide veranda at the rear serves as a living room during the summer months.



Courtesy of *The National Builder*.

THE PHYSICIAN'S HOME SHOULD BE A MODEL OF HYGIENIC PERFECTION. Here is shown the home of a surgeon dentist which is well adapted as a combined home and office.

people admit too little sunshine into their homes. Window-curtains are too often lowered when they should be raised. It is less expensive and far more agreeable to replace faded house-furnishings with new ones occasionally than it is to pay doctors' bills. Residents of the West have a saner attitude in this respect than those of the East. In California it is an unpardonable sin to cut off the sunshine in a building. On the other hand, the Indiana novelist usually describes a home as a house with green shutters.

Wind and rain are climatic factors also to be considered by the architect. Throughout the greater part of the United States the prevailing winds are from the west. Northerly winds are cold, southerly winds are warm. The east winds, least frequent of all, are the rain-bearing winds. The undesirable winds are the cold and boisterous winds of the north and west. The desirable winds, warm and gentle, are from the south.

The climatic considerations are alone sufficiently important to determine the ideal exposure of the home. A southern exposure for the living-rooms is best because this gives a maximum of sunshine and a minimum of cold winds. In a hotel the south-facing rooms are in most frequent demand, for obvious reasons. If the living-rooms of a house can not conveniently be arranged to face the south, an eastern exposure is second-best. This gives the rooms the morning sunshine and eliminates the west and north winds. A disadvantage is the fact

that the rain usually descends from some easterly point. However, this is not a serious defect in the arrangement, as the total time of rainfall and the persistence of easterly winds is but a small fraction of the year as a whole. As a corollary to these conditions, it might be added that the rooms in which the least amount of time is spent, the dining-room for example, are most advantageously given a northern exposure.

Though anomalous, it is true that the proper exposure of chicken-coops was considered long before that of our homes. Poultrymen long ago built their hen-houses with a south exposure of glass and a northern wall unbroken by a single aperture. Only within a comparatively few years have we thought it important enough to plan our homes with equal care.

The question of exposure suggests consideration of the arrangement of our cities themselves. Every one who has traveled extensively in the United States has observed that the best residence portions of our cities are to the west or the north of the business and manufacturing centers, rarely to the east or south. The aristocratic portion of the city is usually the west or the north side, while the east side has become synonymous with the home of the poor, the "cheap-side." Congested cities and those located on water-fronts do not show this fact conspicuously, but the rule is true of American cities generally. Climatic considerations form but one group of many groups which determine the arrangement of a city. But the east side



Courtesy of The National Builder.

THE COURT YARD AT THE REAR OF A PASADENA, CALIFORNIA, BUNGALOW. It is readily apparent why the resident of this dwelling has no doctor's bills to pay. Note the open-air sleeping-porches shown at the left of the picture.

of the city has become the side of lowest real estate value partly because to it the prevailing winds carry the smoke, the dust, the odors and various other excreta of commercial enterprises.

LOCAL CLIMATIC INFLUENCES

The observing traveler can not help but notice local climatic influences on vegetation, on the clothing and the customs of the natives, and, the only matter which concerns us in this discussion, on the architecture. These peculiarities are often observable from a car-window, and may serve to break the monotony of a transcontinental journey. Some conspicuous adaptations of architecture to climate will be enumerated in the following.

Sleeping-porches are a comparatively recent invention. Their increasing use bears witness to the fact that we are wisely



Courtesy of The National Builder.

A DWELLING OF A DESIGN FREQUENTLY ENCOUNTERED IN BOSTON AND IN OTHER NEW ENGLAND CITIES. Well adapted to the extremes and the frequent changes of New England climate.

paying more and more attention to hygiene. For climatic reasons the sleeping-porch can be used with comfort only during the summer-time in the northern portion of the United States, but elsewhere it can be used to advantage throughout the year. In Los Angeles it is difficult to sell or to-rent a dwelling that does not have at least one sleeping-porch.

The screened veranda is also becoming common. It too can be used only during a portion of the year in a large part of the country. But even a limited use serves to satisfy that longing for life in the open. Screens on veranda or window are conspicuously absent on the Pacific Coast, as climatic conditions do not permit the propagation of flies and mosquitoes in large quantities, so screens are unnecessary.

In the Middle West there has been developed an architectural feature known as the summer-kitchen. This is simply a one-room building detached from and immediately to the rear of the dwelling. During midsummer months of almost unbearable heat the family cooking and laundry-work are done in this detached building in order that the dwelling proper may be spared the addition of avoidable heat and odor.

In cities along the Gulf of Mexico in general, and in New Orleans in particular, projecting balconies on the second and third floors are conspicuous. Moreover, the living-rooms of many homes are also on the second or third floors. The climatic significance of these considerations lies in the fact that the ground floor is too damp for comfort and for health. Dryness of floor and air are worth the exertion of stair-climbing. New Orleans is sometimes referred to as the most conservative of American cities. In this particular respect her conservation appears to be well founded on an obvious scientific truth.

The use of storm-doors and storm-windows is good evidence that severe weather is occasionally experienced. Throughout most of the Middle West and in the northern portion of the Atlantic coast region the winters are so severe that dwellings could not be kept comfortably warm without the use of storm-doors and storm-windows, and, moreover, their use conserves fuel consumption. Along the Great Lakes, as well as along the sea-coast, double windows serve the additional purpose of resisting destructive winds which are sufficiently strong to blow in a single thickness of window-glass. In Minnesota and the Dakotas, where temperatures of twenty to forty degrees below zero occur every winter, the lower portions of the humbler cottages are enclosed with tar-paper or burlap each autumn in order that artificial heat may be retained.

The use of tall smoke-stacks on factories shows climatic influences indirectly. By the use of great height in the chimney an accelerated draught is secured for the fire-box, and, moreover, the gaseous waste-products are expelled sufficiently high in the atmosphere to secure their harmless dispersal. The



Photograph by Fred Rath.

A MODERN DWELLING IN A WINTER SETTING.

tallest smoke-stacks in the United States are those in connection with smelters, where poisonous fumes are thus expelled to best advantage. Furthermore, in planning groups of buildings like universities and civic centers the position of the heating-plant should be determined in large measure by the prevailing direction of the wind. The need for considering this matter in the planning is obvious.



Photograph by Fred Rath.

A JANUARY SCENE IN A VILLAGE LOCATED IN THE HIGH SIERRA NEVADA MOUNTAINS.
The need of warm dwellings in such an environment is apparent.

CONDITIONS IN CALIFORNIA

California is the climatologist's paradise. Here within a comparatively limited region one can find an epitome of all the various climates of the United States, besides some climates peculiarly her own. Extremes of climate as well as diminished ranges are exemplified in different parts of this state of infinite variety. For these reasons climatic influences on architecture are readily apparent there. A few of these will be mentioned.

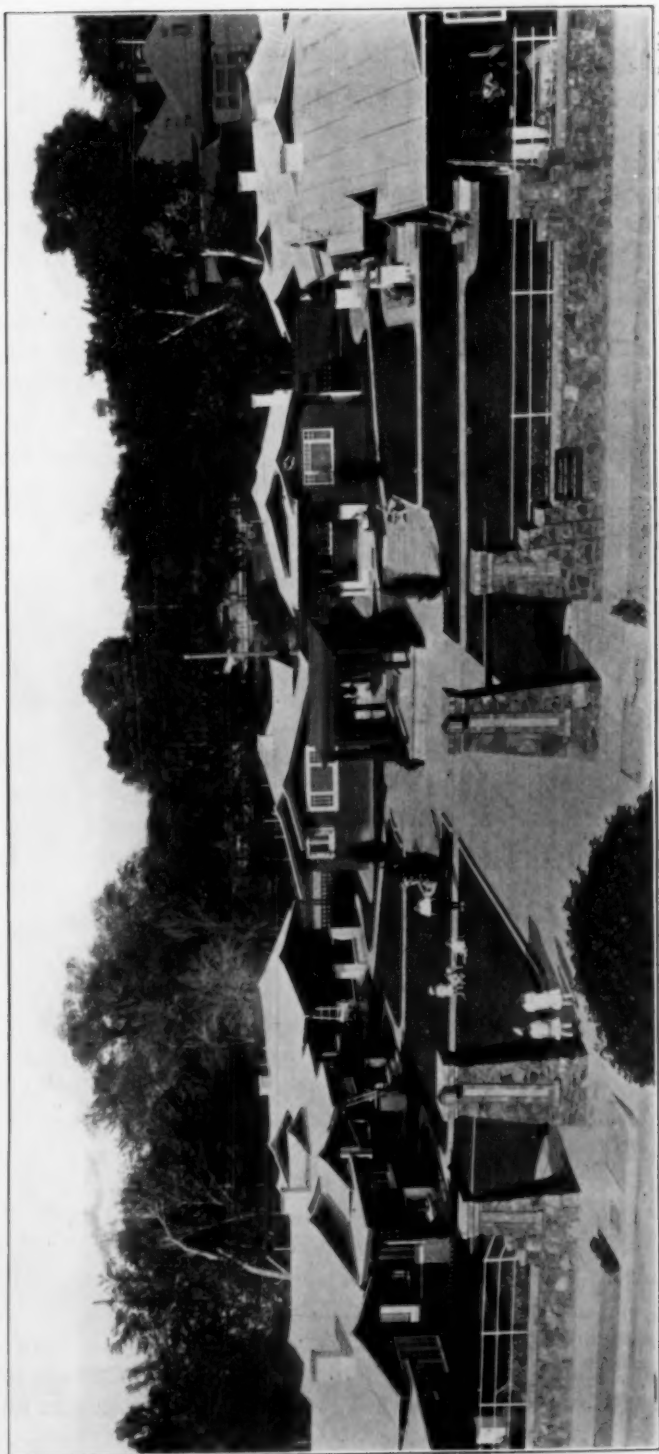
The portion of California which is most densely settled and which is best known in the east has mild temperatures, meager rainfall and few extreme weather conditions. It is therefore a



Photograph by Fred Rath.

A COTTAGE SHROUDED IN A MANTLE OF SNOW. Snow is a poor conductor of heat, and a good protector from winds. Such a dwelling may therefore be kept warm in spite of its frigid appearance.

land of the out-doors, and life is largely in the open. At the recent Expositions at San Francisco and San Diego many of the exhibits were out of doors. Art objects of great value were exhibited in the open. The flower-markets of San Francisco are on the sidewalk in winter as well as in summer, and band-concerts are given on Sundays throughout the year in Golden Gate Park. The Greek Theater of the University of California has no roof. The ventilation of moving-picture theatres, a troublesome problem in a large part of the United States, needs no solution in southern California, where there are only a few nights in a whole year when such pictures can not be viewed under starry skies. The waiting-rooms of railway stations are also in the open, with only a roof for protection from sun and



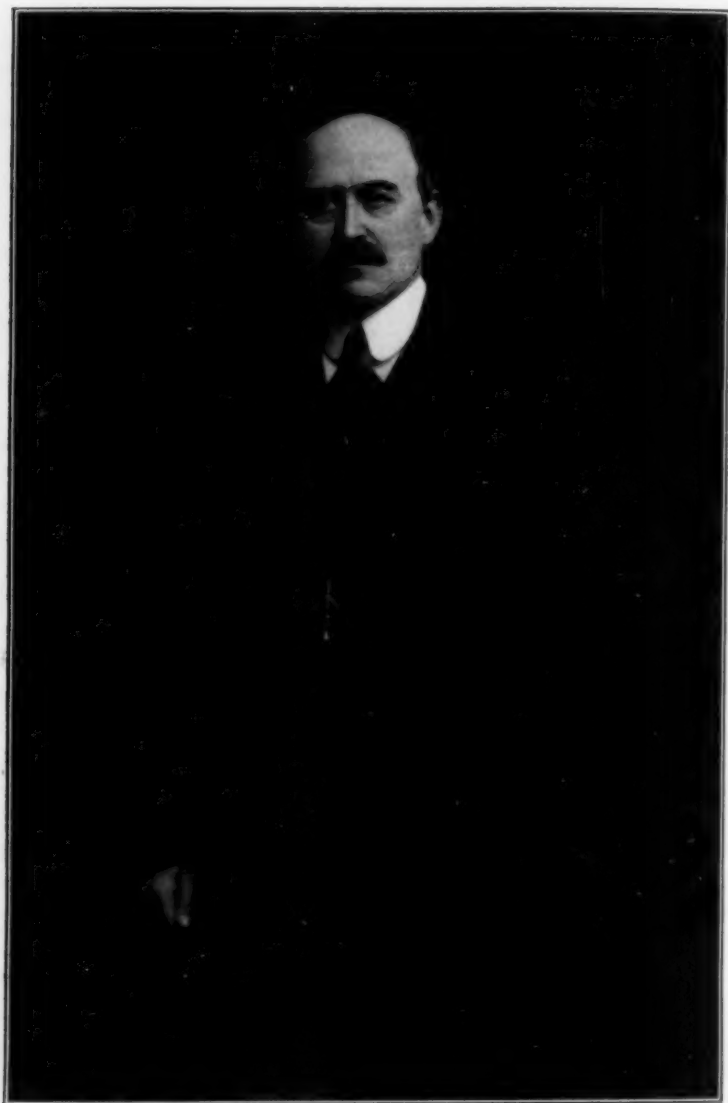
Courtesy of The National Builder.

THE BUNGALOW COLONY IDEA IS INCREASING IN POPULARITY IN THE WEST. Is it any wonder that the death-rate among residents of such a colony is but a small fraction of that which obtains in the tenements along Hester Street, New York, or along Blackhawk Street, Chicago, where more than 2,000 persons live within a single block?

from the occasional shower. Where the sunshine is oppressive, a double roof is constructed so that the air space thus provided may insure cool temperatures in the shade beneath.

CONCLUSION

In this age of efficiency, greater attention is being paid to details than ever before. It appears to be a trait of human nature to consider material and external things first, and personal and internal things last. From the point of view of climate we have long studied the relations of weather to crops. Only recently have we considered its relation to man himself. One phase of the new interest in climatic influences on man himself is that evident in the increased attention being paid in domestic architecture to weather and climate as a condition of environment. The careful architect can not and does not disregard the weather records in planning the most humble bungalow. Considerations of comfort demand that the type of construction, the arrangement of the rooms, the exposure and the heating system, should be adapted to the climate of the region concerned. Considerations of safety demand that the construction shall be made to withstand extremes greater than any which appear in the recent records. Just how large a margin of safety should be provided for is a complex problem, and one whose ultimate solution rests upon an extended weather record for the particular vicinity considered. Matters like these have influenced the design of the home, which, like many other things, has evolved rapidly of late, and is even now in a transition stage. In the well-planned modern home the living-rooms face the south to secure a maximum of sunshine and a minimum of cold and boisterous winds, while the least used rooms are placed to the north, as that is the least desirable exposure, climatically considered. The top-most room, formerly a dusty attic or store-room, has become a sun-parlor. The basement, formerly the laundry or cellar, has become the summer study or work-shop. By a wise dispensation of nature, a comfortable environment is usually a hygienic environment also. Collectively, man has gained much by ceasing to be a nomad. Individually, men are happiest when they live in their own homes. Natural environment determines in large measure the nature of that domicile. Weather conditions are now considered by the conscientious architect in planning the construction of such a dwelling, and the artificial climate which is to be created within it.



WILLIAM BULLOCK CLARK,

Professor of geology in the Johns Hopkins University, eminent for his contributions to geology, who died on July 27 at the age of fifty-seven years.

THE PROGRESS OF SCIENCE

THE NATIONAL RESEARCH COUNCIL AND THE WAR

As has been described in *THE SCIENTIFIC MONTHLY*, the National Research Council was organized under the auspices of the National Academy of Sciences at the request of the President of the United States to promote scientific research and especially to cooperate with the government in the present emergency. It has now become a department of the National Defence Council, dealing with the organization of science and research as affected by the war.

As our government through its scientific departments devotes more attention to scientific work than any other nation, they would be the natural agencies to take charge of the applications of science to the national welfare in the present emergency. It may, however, be that better results can be secured by calling on the scientific men of the whole nation who are the best fitted for such service. This was indeed the plan of the government in making the National Academy of Sciences its scientific adviser.

Dr. George E. Hale, director of the Mount Wilson Solar Observatory of the Carnegie Institution, is chairman of the National Research Council, and gave his entire time to the work at Washington until his recent return to California; Dr. Robert A. Millikan, professor of physics in the University of Chicago, now represents the National Research Council, in general charge of the scientific questions referred to it. Other scientific men who are devoting their time to national service in Washington are: Dr. C. E. Mendenhall, professor of physics in the University of Wisconsin, who is in charge of the development of instruments used in connection with aeroplanes; Dr. Raymond Pearl, of the University

of Maine, chairman of the agricultural committee; Dr. Alonzo E. Taylor, of the University of Pennsylvania, chairman of the food committee; Dr. Marston T. Bogert, of Columbia University, chairman of the chemistry committee; Dr. Victor C. Vaughan, of the University of Michigan, chairman of the committee on medicine and hygiene; Professor Robert M. Yerkes, who has just accepted a call to the University of Minnesota, chairman of the psychology committee.

Among scientific men in Washington who are taking an active part in the work of the National Research Council are Dr. Charles D. Walcott, secretary of the Smithsonian Institution; Dr. S. W. Stratton, director of the Bureau of Standards, and Dr. Van H. Manning, chief of the Bureau of Mines. Scientific men from England, France and Italy have been in Washington in consultation with the members of the National Research Council.

Members of the foreign service committee of the council, who have been in France and England for a period of two or three months, have returned to the United States and have brought with them much valuable information relative to the organization and development of scientific activities in connection with the war. A few members of the committee have remained in France to continue their observations and investigations, under special detail. Formal reports have been submitted to the council, through its executive and military committees, relating to the observations and experiences of the members of this committee, in connection with which recommendations for cooperative investigations in this country are made.

The government has so far made little or no provision to pay the cost of this scientific work, most men of



A TREE FERN (*Cibotium menziesii*) NEAR THE VOLCANO KILAUEA ON THE ISLAND OF HAWAII. The tree ferns are conspicuous elements in the Hawaiian landscape in the wet areas.

science having given their services without salary. The work of the council has been supported by private gifts, including an appropriation of \$50,000 from the Carnegie Corporation. Some scientific men have, however, enlisted as officers in the army, and the passage of the food bill and other measures will

doubtless permit the government to support and control the scientific work being done on its behalf.

EXPLORATIONS IN THE HAWAIIAN ISLANDS

PROFESSOR A. S. HITCHCOCK, systematic agrostologist, U. S. Department of Agriculture, has spent about

six months in the Hawaiian Islands, collecting and studying the flora, especially the grasses. He was assisted by his son, A. E. Hitchcock. The six larger islands of the group were visited.

The islands are of volcanic origin and are mainly composed of lava. Kauai, geologically the oldest island, shows the greatest effect of erosion, its deep canyons rivaling the beauty of the Grand Canyon of Colorado. Hawaii, the youngest island geologically, shows a great variety of recent lava. The active volcano Kilauea (4,000 feet) with its pit of boiling lava, is on Hawaii, while Haleakala, said to be the largest crater in the world, is on Maui, the second largest island of the group.

The flora of the islands is interesting because of its diversity and peculiarity. The diversity is due to the extremes of altitude and of moisture. All the islands are mountainous. Hawaii, the largest island of the group, includes the two high peaks Mauna Kea, 13,825 feet, and Mauna Loa, 13,675 feet. Vegetation on these peaks reaches to about

10,000 feet altitude, above which there is much snow in winter and snow banks persist throughout the year. The trade winds deposit their moisture on the eastern slopes of the mountains, thus giving rise to rain forests, while on the lee sides of the islands the conditions approach aridity. The rainfall on Waialeale, the highest peak of Kauai, is as much as 600 inches per annum, while on the western sides of the islands it may be less than 15 inches.

In Honolulu there is a marvelous variety of exotic trees and shrubs, including many kinds of palms. There is an especially rich collection of plants in the Hillebrand Garden, formerly owned by the author of Hillebrand's "Flora of the Hawaiian Islands." Scores of varieties of *Hibiscus* line the streets as hedge plants. The monkey pod or saman tree (*Pithecolobium saman*) is a beautiful round-topped shade tree.

One of the introduced trees of great economic importance is the algaroba tree, or kiawe, as the Hawaiians call it. It is found in a belt on the low-lands along the shores



NIGHTBLOOMING CEREUS. Growing over the wall in front of Punahou College, Honolulu. Strikingly beautiful when in flower.

of all the islands and occupies the soil almost to the exclusion of other plants. The pods are very nutritious and are eagerly eaten by all kinds of stock. Its flowers furnish an excellent quality of honey. The Molokai ranch alone produces 150 to 200 tons of strained honey per year. The prickly pear cactus (a species going under the name of *Opuntia tuna*) has become extensively naturalized in the dryer portions of all the islands. Ranchmen utilize this for feed when other kinds become scarce, the cattle eating the succulent joints in spite of the thorns. Two introduced shrubs now occupying extensive areas have become great pests. These are guava, whose fruit furnishes the delicious guava jelly, and lantana, with clusters of handsome parti-colored flowers. One of the important indigenous trees is the koa. This produces a valuable wood much used in cabinet making, now becoming well known through its use for making ukuleles. Among the peculiar plants of the islands is the silver-sword, a strikingly beautiful composite with glistening silvery leaves, which grows only on the slopes of cinder cones in the crater of Haleakala and in a few very limited localities on Hawaii. The family Lobeliaceæ is represented by about 100 species belonging to 6 genera. The numerous arborescent or tree-like species are very peculiar and characteristic. Many of them form slender trunks like small palms, crowned with a large cluster of long narrow leaves. The trunks of some species are as much as 30 or 40 feet high and the large bright-colored flowers are sometimes remarkably beautiful.

The ferns are numerous and in the moist areas are often a dominating feature of the flora. Three species of tree ferns are found on the islands, and in some places form extensive forests. These plants pro-

duce at the base of the stipe, a great ball of brownish-yellow wool called *pulu* by the natives and used by them for stuffing pillows and mattresses.

A peculiar ecological feature of the islands is the open bogs found upon many of the summits of the high mountain ridges in the regions of heavy rainfall. Many species form more or less hemispherical tussocks which rise above the general level of the bog. A showy lobelia with numerous large cream-colored flowers as much as three and one half inches long, peculiar violets, and a sundew are found there. These boggy areas are devoid of trees and sometimes occupy rather extensive areas, the one on Mt. Wai-aleale covering several square miles.

SCIENTIFIC ITEMS

WE record with regret the death of Charles Horton Peck, former state botanist of New York; Edward Randolph Taylor, the American industrial chemist; of William Wallace Tooker, an authority on Indian archeology, and Robert Bell, formerly chief geologist of the Geological Survey of Canada.

THE Albert medal of the Royal Society of Arts for the current year has been awarded to Orville Wright, "in recognition of the value of the contributions of Wilbur and Orville Wright to the solution of the problem of mechanical flight." The report of the council says: "The largest share in the honor of having invented the aeroplane must always be given to the two brothers, Wilbur and Orville Wright."

M. ERNEST SOLVAY, the distinguished Belgian industrial chemist, who has made large gifts for the endowment of chemical and physical research, has been elected a corresponding member of the Paris Academy of Sciences in the place of the late Sir Henry Roscoe.